Telephony

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"A FIGHT WITH AN OCTOPUS"

Most Important Work in the History of the Independent Movement, Reviewed by

William H. Selden

THE most important work in the history of the Independent telephone movement was the publication of Paul Latzke's series of articles in "Success" magazine from February to August, 1906, under the caption, "Fighting the Telephone Trust." Up to the time of the appearance of these articles the Independent industry had had no spokesman before the American people. So far as general public knowledge was concerned, the Bell people, thanks to their tireless press man, had had things all their own way. The telephone press had done its share in setting the true facts into type, but the telephone press after all has a limited circle, and does not reach the mass of the people. And it was here that knowledge regarding the standing of the Independent movement was most needed.

The "Success" series furnished this knowledge in a manner never surpassed and scarcely ever equaled. By singular good fortune it chanced that the matter was taken up by a man who was qualified for the work to a degree. He had worked for years as a reporter and editor on the chief New York newspapers, and later developed into a magazine writer of national reputation. He had specialized in his magazine work on the romantic side of industrial work, popularizing the stories of men's achievements in the commercial realm, until they had all the fascination of stories of adventure. No one had even succeeded in handling matter of this sort in a story-telling way, and it is natural that the work of Mr. Latzke should have made a most instantaneous success.

Paul Latzke, Author of "A Fight with an Octopus."

The magazine editors eagerly sought his production and gladly paid prices for special articles by him that had never been approached except for the productions of the highest class fiction writers. By a fortunate combination of circumstances, Mr. Latzke, while in the midst of his work, had his interest especially riveted by the Independent telephone movement. As a result, he became regularly enrolled in its ranks as the publisher of one of the Independent journals. To this work, however, he devoted only part of his time, retaining still his connection as a writer of magazine matter, and at the present time he still ranks as the leader of the large school of writers that have grown up in the popular industrial field.

It occurred to Mr. Latzke early in his career as a telephone publisher, that the story of the Independent movement would work up into a series of articles that any of the important magazines would be glad to publish. He began, accordingly, over three years ago, gathering the necessary material, and as his other engagements permitted he put this material into story form. The result was the series secured by "Success" and received throughout the country as one of the most graphic and interesting pieces of literary work ever turned out.

Naturally enough, the Independent telephone men of the country were taken by storm. For the first time, they saw the facts regarding their struggles and ultimate triumph set

forth in a manner that was not only intensely fascinating to themselves, but was also certain to rivet the attention of every lay reader into whose hands the matter fell. At practically every county, state and national meeting of Independent telephone men, these articles were taken up and discussed, and the desire was voiced in a thousand places that this exposition of the Independent work should be perpetuated in permanent form and "put in the hands," as one enthusiast expressed it, "of at least five millions of people." It was felt that nothing would so stimulate progress, that nothing would so solidify investments, that nothing would help so much in securing franchises and reasonable concessions and the good-will of the American people, as the general spread of these articles in book form. It was in response to this universal sentiment that the publishers of TELEPHONY determined to take up the publication, if it could secure the consent and co-operation of Mr. Latzke. The proposition was a somewhat difficult one, because it could not be pursued along the ordinary commercial lines. It was felt that the circulation of the articles in book form must not alone be very extensive, but that it must also be rapid. The problem was finally worked out in a manner which promises to accomplish everything that the Independent telephone men have hoped for in this connection. By figuring down to the lowest estimate, it was found possible to produce the book in high-grade, dignified, attractive form and still sell at a price that would enable every person interested in the spread of this matter, to purchase large quantities of the work without too severe a financial strain. The result is a book on fine laid paper, with cover-plate and title page in two colors and illustrations in fine brown halftone tint.

The illustrations, which did not appear in the original magazine publication, are particularly apt and valuable. They consist of photographic views of the leading Independent exchanges and factories. These illustrations have a special and important purpose, as the author explains in an editorial note.

"Throughout this work," he tells us, "the author has endeavored to make it clear that the fighters for Independence in the telephone field have won. In proof of this many facts and figures have been cited. But, after all, there is no proof so strong as that which makes out its case at a glance. Therefore the camera has been used to reinforce the pen, and photographs of some of the leading Independent exchanges and factories have been employed to illustrate and 'illuminate' the text. They tell most graphically the story of Independent success."

Altogether, text, illustrations, printing and paper show the highest art of bookmaking and one marvels at the price at which the publishers announce they are going to put out the work—namely, 12½ cents the copy in lots of 1,000 or more. This astonishing price has been made possible by the printing of a first edition of 250,000 copies. Deliveries of the book are to begin September 15, orders being filled in the order in which they are received.

In response to the preliminary announcement, large orders have already been received, one company having contracted for 40,000 in one lot, with a promise of further orders to follow. It is the intention of this company to give this book away as a souvenir to all of its subscribers.

It is probably unnecesary to review this work at length, as every reader of TELEPHONY is no doubt familiar with it through having read the series in "Success." But a brief reference to the leading points may be interesting. In the first place, in order to popularize the work even more thoroughly than in the original form, the title has been changed and the work as it now appears will be known as "A Fight with an Octopus." The dedication is characteristic, the book being inscribed by Mr. Latzke, "To the sturdy citizens who risked their fortunes and their careers in the cause of American Industrial Independence, and who won a brilliant victory, in the fruits of which the entire nation has shared, this work is most admiringly dedicated."

In his "foreword," the author strikes a stirring key, one to which the fibre of every good American will respond. It is reproduced in full here because we feel that every one will be better for reading it:

"This story should appeal especially to those who have good, red American blood in their veins. It is the story of a magnificent fight that was won against overwhelming odds. It is the story of a smug coterie of "Boston gentlemen" of the immaculate type, put to flight by a few sturdy men out of the West. It is the story of a low, scheming campaign of greed, that was turned into a route by a fine, sentimental, American citizenship. It is a story full of dramatic interest not because of the manner of telling, which is simple and commonplace enough, but because of the facts it relates.

"It is the story of at least one trust that was 'busted.' It is a story that, while dealing with the details of an industrial war, will interest even the women, for it is full of good, clean, honest fighting, of the deeds of men who stood shoulder to shoulder under the Stars and Stripes, and, in the name of American freedom and independence, lined up against the most complete and relentless and successful monopoly of the times—and beat it to a pulp. It is a poor sort either of man or woman, who cannot find somewhere in the record of these fighters the story of a deed that will stir the pulse."

It is, indeed, "a poor sort of either man or woman" who can read the story without stir. It is graphic, full of vim, and with action in every line. The author begins by setting out the salient facts of the tremendous growth of the Independent industry, and figures showing that the Bell Telephone Company has been distanced in the land by at least half a million telephones. He begins his story by reciting the dramatic forecast made at Washington, twenty years ago, when the Bell patents were in suit. One of the lawyers arrayed against the monopoly, pleading before the supreme court of the United States, made the prophecy in the following language:

"The whole business was cradled in fraud. Mr. Bell's attorneys had an underground railroad in operation, between their office and Examiner Wilber's room in the patent office, by which they were enabled to have unlawful and guilty knowledge of Gray's papers, as soon as they were filed in the patent office.

"If this court finds in favor of the American Bell Telephone Company, it will enable these plaintiffs to perpetuate the fruits of this fraud for many years, and to fasten on the necks of the American people a gouging monopoly, from which there will be no escape, even after this patent has expired; for, by that time, this corporation will have so wound its tentacles about the communty that only an uprising of the people, such as is not conceivable, will be powerful enough to shake it off."

The first few chapters that follow recite the dramatic points connected with the original fight against the Bell and show how the monopoly was finally established under the decision of the supreme court sustaining the Bell patents. The author then plunges into the history of the discovery of the telephone, dating back to the year 1854—more than a quarter of a century before Bell had even dreamed of electrical speech transmission. From this point the schemes of the Bell company are followed with minute care, each point made being illustrated by a graphic anecdote.

Then begins the story of the assault on the monopoly, beginning in the early part of 1893. The various plots initiated by the Bell Telephone Company to maintain exclusive control of the business are traced to their source and their overthrow is told in picturesque and romantic lan-

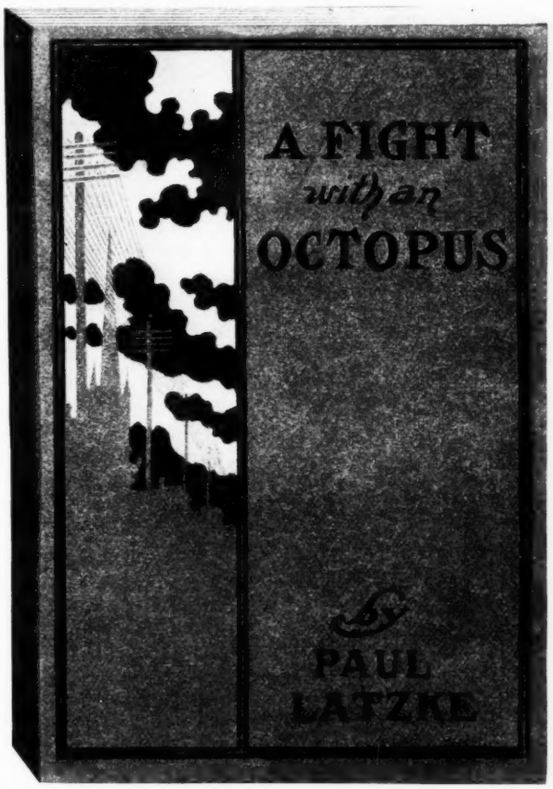
guage, which will appeal to every lay reader as well as every telephone man.

The chapter devoted to the work of the press bureau maintained by the Bell Telephone Company at an expense of millions of dollars, will commend itself particularly to the officers of Independent telephone companies who have had to combat the evil effects of this bureau. It is worth while reproducing here in the author's own language one of the most interesting incidents in connection with this press bureau work, an incident which deals with the debasement of one of the great newspapers of the country, the New York Tribune.

"In the years that I have followed the telephone fight," says the author, "I have made a special study of the Bell company's press work. Naturally this should make me reasonably expert in picking out material disguised as news matter that has been run 'at reading-notice rates.' But, in this instance, I, myself was completely taken in, until my attention was specially called to certain peculiarities about the article, by the manager of an Independent plan in New Jersey.

"Still I couldn't make out what object the Bell Telephone Company could hope to attain by the publication of such matter.

" 'Why,' declared my Jersey friend, 'that's as clear as day. They are trying to lull the suspicion of the farmer by having it appear that they have been beaten and that they have thrown up their hands. They are seeking to create a condition of mind that will make the farmer believe it is now perfectly safe to tie up to the tamed monopoly. I happen to have had personal experience of the way this article is working. It was reproduced in the weekly and triweekly issues of the "Tribune," which have probably as large circulations among farmers as any publication in the United States. One of the farmers down my way, who represents a co-operative company with which I am negotiating a traffic arrangement, showed this article to me as a complete refutation of my statement that it was dangerous for the farmers to ally themselves with the Bell under any circumstances, because the monopoly would in the end swallow them up.'



Paul Latzke's Great Industrial Story.

"Two paragraphs in the article, on close study, revealed the 'nigger in the woodpile' clearly enough. One of these paragraphs reads: 'This means that, in the end, all lines and exchanges must be connected; the two systems will be, for every purpose of physical operation, merged into one. It will mean, in the end, that two systems cannot be maintained side by side.'

"That is the stereotyped matter sent out from Boston day in and day out, from year's beginning to year's end, only this time it was approached from the other direction.

"A little further along occurred the other paragraph which gave the key to the motive. This paragraph read:

" 'In Iowa, it is true, the (Bell) company has been defeated, but that has been accomplished only by peculiar local conditions. The farmers of Iowa won the victory with their rural lines. The Bell people still have their powerful position, their immensely valuable business in other states. They are still strong in legislatures and with congress; they are still able to buy every promising improvement, every device protected by patent that is offered to them.'

"Not long after my attention had been called to this article its fruits began to appear. From a hundred small country papers came clippings summarizing the 'Tribune' story. These summaries were, as usual with the Bell press work, exactly alike even in the matter of punctuation; they wound up with this paragraph:

" 'The result will be that the latter (The Bell Telephone Company) will now permit connection to be made between its instruments and those of the other companies (the Independents), and it will no longer be necessary for anybody to rent two telephones from antagonistic establishments.'

"It was the siren's song with which the monopoly hoped to lull the fears of its opponents in the backwoods districts so that they would yield themselves to its protection and friendly assimilation. One of the telephone periodicals put it thus, in commenting on this stroke of literary genius:

" 'Could anything be much "smarter" than that? It will no longer be necessary for anybody to rent two telephones from antagonistic establishments. "Come right into our parlor, Mr. Farmer; we're harmless now." Where is the "green goods" circular that can touch this precious document for clean-cut knavery?' "

It is in the enlightenment of the public mind regarding facts such as these that the great value of Mr. Latzke's work lies. And it lies, also, along another line, namely, in the chapter that he devotes to showing the sound condition from a financial standpoint of the Independent industry, especially as compared with the condition of the Bell telephone company. He proves by facts and figures that while three of the greatest Bell companies have been practically wiped out of existence because of the reckless management of the Boston officials, the record of failure among the Independents is less than the record of failures among national banks. And, as authority for this, he gives statistics put out by the two great commercial agencies.

It is unnecessary to point out to anyone who is actively connected with the Independent business, the importance of putting facts such as these graphically before the people. It means that if a sufficient number of these books are circulated, the troubles of the Independents in financing their properties will be largely at an end. It means that any man who has a good proposition may safely go to the people for capital, provided he has prepared the ground in advance by putting into the hands of the investors and the general public this volume of 180 pages which gives a picture with which many Independent telephone men are familiar, but which to the outside world has heretofore had no existence. It is because of the faith that TELEPHONY has in the value of this work that it has gone into the publication on so large a scale and the publishers may feel certain that they will have the co-operation of every wide-awake operator.

MANSON'S PRACTICAL SUGGESTIONS

A Series of Short Articles Dealing with Important Phases of Telephone Work

By Ray H. Manson

REPAIRING SWITCHBOARD CORDS.

THE only part of a modern manually operated switchboard which is subject to a comparatively rapid wear, and which must be carefully watched and repaired, is the flexible cords used in connecting the subscribers' lines. The latest types of these cords give a long life, and if inspected and repaired at the proper time, require only a small amount of labor to keep the switchboard in excellent working condition.

The plug end of the cord is first to show wear and become defective, due to the continual handling of the operator, the remainder of the cord seldom causing trouble. A reinforcement is thus braided into this portion of the cord for an extra protection, and it is usually made eighteen or more inches long, so that by carefully cutting back and "butting" the cord each time it shows defective, it is possible to make at least seven plug end repairs. As the cords of a switchboard must need regular attention, it is preferably done systematically by the careful repairman, thereby reducing the maintenance cost of this portion of the exchange to a minimum. A small repair kit consisting of a partitioned tray, containing the various parts of the switchboard plugs as well as the cord tips and binding thread used in the repairing, is found to be a great assistance in this work.

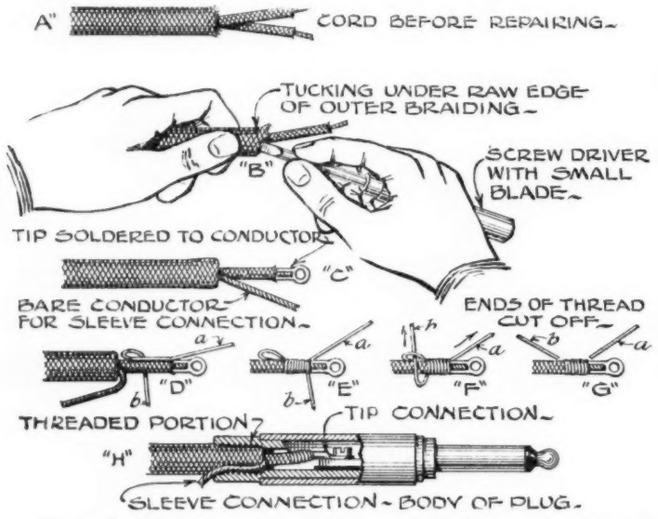


Figure 1—Repairing a two-conductor switchboard cord. The end of outer braiding is tucked under instead of binding as in the old method.

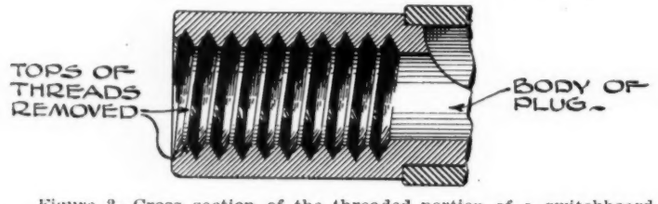


Figure 2—Cross section of the threaded portion of a switchboard plug into which the cord is screwed. The tops of the threads are removed to prevent cutting the braiding of the cord and the sleeve conductor.

Two good methods of butting a two-conductor cord are shown in the accompanying illustrations, Figures 1 and 3.

The first method is best performed on a cord which has a waxed covering. The cord is cut back a sufficient distance to remove the defect which exists in the outer braid or in the conductors themselves. In testing for the latter a telephone receiver and battery is connected in series from one end of the cord to the other, the cord being moved about so as to determine whether the conductor is broken, this condition being made apparent by a scratching noise in the receiver. The raw edge of the outer braid is now folded under and pushed back, as shown at *B*, Figure 1, so as to make an enlarged portion which will tightly screw into the thread of the plug. The covering of the sleeve conductor, if any, is cut away so as to leave the conductor itself exposed, while the tip conductor is cut the proper length to reach its binding screw when inserted in the plug. Then the small connecting clip is soldered in place, as shown at *C*, and the raw end of the insulation carefully found, as illustrated at *D*, *E*, *F* and *G*, with waxed linen thread, the result being a finished butt, as shown screwed into the plug at *H*. In finishing this binding the loose end, *b*, Figure 1-*F*, is passed through the loop of the thread and drawn under the binding by pulling on end *a*. This obviates tieing the ends of the thread, which can now be cut off, leaving a neat and secure job.

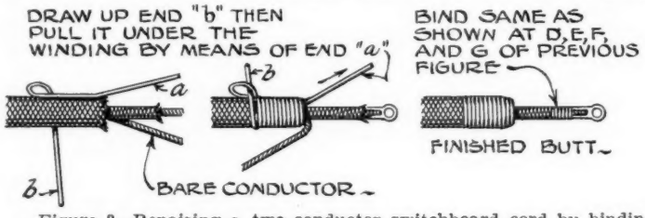

DRAW UP END "b" THEN PULL IT UNDER THE WINDING BY MEANS OF END "a"
BIND SAME AS SHOWN AT D, E, F, AND G OF PREVIOUS FIGURE
FINISHED BUTT
BARE CONDUCTOR

Figure 3—Repairing a two-conductor switchboard cord by binding the end of the outer braiding.

After butting and before attaching to the plug some repairmen prefer to boil the end of the cord in beeswax, for the length of the reinforcement, so as to make it moisture-proof and prolong its life. When removing the cord from this operation, it is necessary to whip off any surplus wax before it cools, as otherwise the cord will be too stiff to handle. The sleeve conductor is doubled back when screwing the cord into the plug so as to make a good contact with the metal of the plug body, care being taken that the cord makes a tight fit. The projecting end of the sleeve conductor is now cut off flush with the plug body to prevent crossing with adjacent plugs.

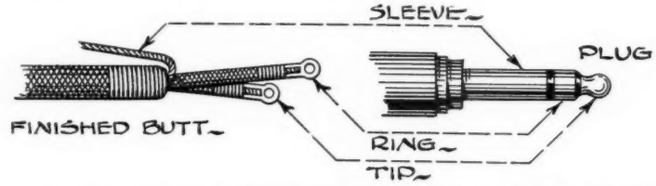


Figure 4—A three-conductor cord repaired by the binding method shown in Figure 3.

The tops of the individual threads on the threaded portion of the plug casing, into which the cord is screwed, are cut off in some cases (Figure 2) so as to avoid the sharp edges, which have a tendency to sever the sleeve conductor as well as the outer braid. Another claim for this flat thread is its ability to hold the cord from turning in the plug when once properly fitted.

A second method, shown in Figure 3, illustrates the or-

dinary way of butting cords, and is especially adapted to a braiding which has no beeswax filling. The cord, after being cut back and tested for further defects, has the raw edge of its outer braiding wrapped with a stout waxed linen thread, instead of tucking under as in the first method, the remainder of the operation being the same as shown at *C*, *D*, *E*, *F* and *G* of Figure 1. Beeswaxing, as previously explained, also will be beneficial to this type of cord.

Figure 4 shows a finished butt for a three conductor

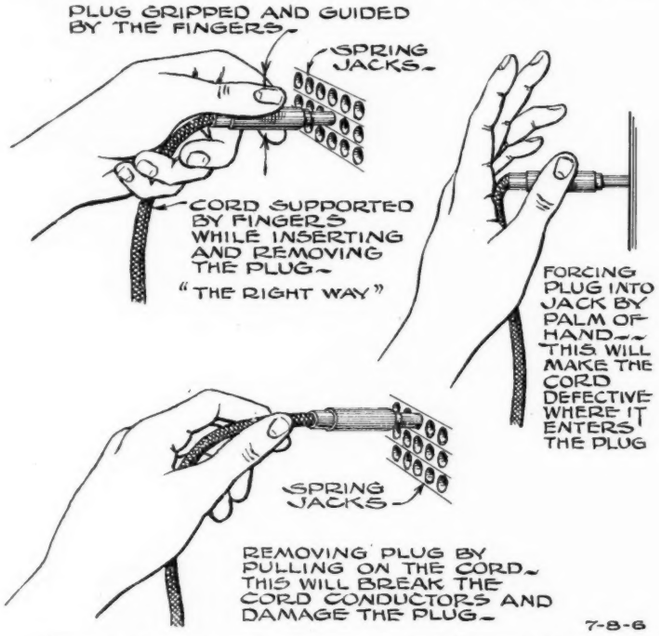

PLUG GRIPPED AND GUIDED BY THE FINGERS
SPRING JACKS
CORD SUPPORTED BY FINGERS WHILE INSERTING AND REMOVING THE PLUG
"THE RIGHT WAY"
FORCING PLUG INTO JACK BY PALM OF HAND—THIS WILL MAKE THE CORD DEFECTIVE WHERE IT ENTERS THE PLUG
SPRING JACKS
REMOVING PLUG BY PULLING ON THE CORD—THIS WILL BREAK THE CORD CONDUCTORS AND DAMAGE THE PLUG
7-8-6

Figure 5—The right and wrong way to handle a switchboard plug and cord.

cord. The work is performed in the same manner as for a two-conductor cord.

Nearly every exchange has rules for the proper handling of the switchboard plugs so as to lessen the wear of the cord. Figure 5 illustrates the accepted "right way" to insert and remove the plug from the jack, also two destructive methods of doing these operations. With only a slight knowledge of the limitations of the switchboard cord, its life can be greatly prolonged and exchange troubles reduced to practically nothing.

A TELEPHONE FIRE ALARM SYSTEM.

A telephone exchange is often made to serve as the only fire alarm system in a large number of cities, and when properly arranged can be made to give a very reliable service.

Figure 6 shows a simple fire alarm circuit now in use in a city of about 40,000 population, no other fire alarm system being provided.

The regular common battery telephone lines from the various fire stations, three of which are shown in the circuit, terminate on the main switchboard in the customary line lamp signal *P*, and answering and multiple spring jacks *R*. Switching relays *A*, *B* and *C* are interposed in these lines at the main distributing frame, and are so wired that the switchboard ends of the lines can be cut off and the fire station circuits connected together and extended to the chief operator's desk. Thus all of the fire stations can be signalled and notified as to the location of the fire simultaneously.

When this exchange receives a notification of fire over its lines, the local operator receiving the call immediately works the "fire" button *D*, *E* or *F* (one button being provided for each operator) and at the same time trunks the call to the chief operator's desk through circuits provided for that purpose, allowing the latter to receive the exact information. The act of operating the button *D*, *E* or *F* establishes a circuit through the winding of the relay *H*, pulling up its armatures, one of which, *y*, completes a locking circuit so that it remains in its operated position when the local operator releases the key, while the other armature, *z*, provides a path for current through the winding of the switching relays *A*, *B* and *C*. The operation of the latter relays cut off the switchboard ends of all of the fire station lines and substitutes a circuit to the keg *G*, located on the chief operator's desk. Inside contacts of this key are connected to the exchange ringing generator so that when the operations just described have taken place, ringing current it projected to the sleeve sides of all of the fire station lines, immediately ringing all of the large polarized fire station bells, the return path for the ringing current be-

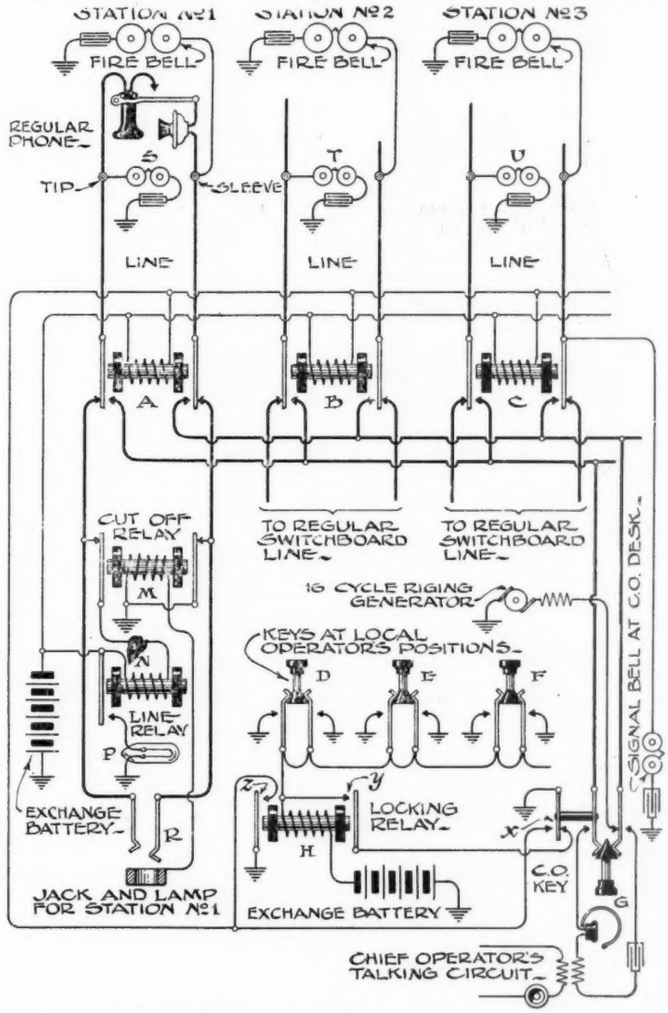


Figure 6—A simple fire call system applied to a common battery exchange. Regular subscribers' lines are used without interfering with their service excepting when a fire call is given.

ing through ground. A signal bell, located at the chief operator's desk, is connected to the sleeve side of one of the fire station lines so that the chief operator not only is notified that there is a fire call, but that the fire stations are being properly signalled.

As soon as the chief operator receives sufficient information through the subscriber direct or by the local operator repeating the message, she presses the key *G*, which cuts off the ringing current and substitutes her talking circuit, so that she can transmit the fire call to all of the fire stations simultaneously. In this way the chief operator is alone responsible for the correct submitting of the message to the fire stations.

Key *G* normally provides a path for the current used in locking the relay *H* in its operated position, but when the plunger of this key is pressed the latter condition is destroyed, the relays *A, B* and *C* then being kept operated by current flowing through the contact *x* to ground instead of through the contact *z*. When the pressure on key *G* is released, its springs assume their normal position and the entire circuit, including the switching relays *A, B* and *C* reverts to normal.

Current for ringing the regular telephones of the exchange in question is projected over the tip side of the lines from a generator, one terminal of which is grounded, thus allowing the fire stations which have their regular telephone bells *S, T* and *U* bridged from tip side of the lines to ground, to be called for exchange service by the local operators without sounding the fire gongs, the latter being bridged from side of line to ground. It will also be seen that a fire call can be transmitted regardless of whether the fire station lines are busy, while the use of non-locking relays in the signalling circuits make it impossible to tie up

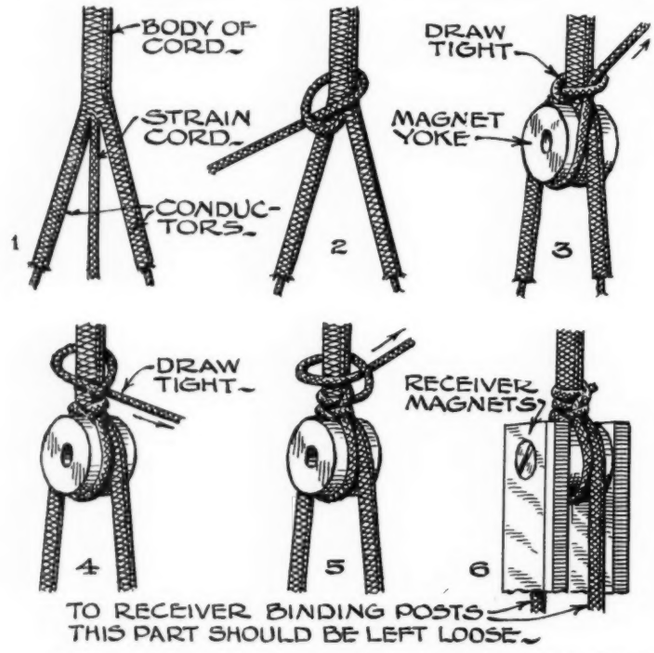


Figure 7—A simple and secure method of tieing the strain cord in a telephone receiver.

the system through forgetfulness of the operators. Keys *D, E* and *F* are not only self-restoring but are made so that the plungers are in their normal positions when depressed, requiring a lifting motion to operate the signal circuits. This serves as an additional precaution against the accidental turning in of a fire alarm.

In operating a system of this description it is necessary that the fire stations report their number back to the chief operator as soon as they understand the fire call, thus serving as a check on the proper operation of each line circuit.

In smaller towns, where a volunteer fire department is maintained, all of the firemen's lines are provided with the switching relays in addition to that of the fire department, so that the operation of giving a fire call is greatly simplified over the ordinary method of working.

A METHOD OF FASTENING STRAIN CORDS IN RECEIVERS

Most telephone and switchboard cords are made so that when properly connected all mechanical strain is taken from the electrical conductors and terminal fastenings, thereby greatly prolonging their life and doing away with annoying and expensive troubles. This result is accomplished in several ways, the most common of which is the use of a projection of the outer braiding called a strain cord. The latter, in order to be effective is fastened to the apparatus so that the ends of the conductors have some slack and cannot receive a strain when the body of the cord is pulled in any direction.

This removing of the strain from the conductors is especially desirable in the case of cords for telephone receivers, as these instruments are subjected to much abuse and, being distributed over a large territory, make repairing an expensive job. The proper fastening of the cord to the receiver is thus of great consequence. One good method for doing this work is shown in Figure 7, which is self-explanatory. In doing this operation, it is necessary that the two portions of the cord extending to the receiver binding posts are left sufficiently loose so as not to be subjected to strain by any future stretching of the strain cord.

THE PARTY LINE.

No one will dispute the convenience of the modern telephone. As a rule operators are courteous, patient and considerate. What they have to contend with is an oft-told tale of trials and tribulations that would drive the average man to his cups. Fortunately, however, few men aspire to the headgear of a metallic receiver and in consequence few are thus employed.

But there is no rule without the exception. The abomination of the telephone system is the party line.

Recently a business man in a western town went to the country, and had a whirl with the party-line system that was "the limit." Such was his own forceful way of expressing it.

As it happened, this man's daughter was ill, and he was anxious at the time to learn of her condition. He stepped to the telephone in his friend's house, took down the receiver, and—

"They say that Susie Smith's going to marry that Sam, you know, that feller who—"

"Yes. I know him. He drinks like the all-get-out, too."

The man hung up the receiver. He waited about twenty minutes, then took it down again only to hear those same two women pecking away with their neighbor gossip.

"Get off the line there, you eavesdropper!" shouted one when they heard the man take down the receiver.

In silence the receiver was hung up again, and he turned to his farmer friend with displeasure written in every feature of his face.

"By hen!" exclaimed his host, laughing heartily; "I guess you're up against it, all right, all right."

Another fifteen or twenty minutes ticked into eternity. Again the city man took down the receiver. Still they were talking and scandalizing. Up went the receiver again, and he went out in the open and gazed at the cattle, sheep, hogs and about everything else in sight. He gazed thus about twenty minutes or half an hour this time. Then he hurried back to the house, smiling a smile that spelled determination in every wrinkle.

"If you ladies will hang up a minute so I can get central," he said, taking down the receiver, "you'll hear something that will be the choicest, raciest bit of gossip you've ever heard over this line, if you'll get on the line again after we get started."

Instantly and simultaneously the man heard them put up their receivers. He got central and was scarcely connected with his house, when, click, click back on the line the muck-rakers came.

The city man laughed in his sleeve, and began to talk with his wife in German.

Bang! Bang! Both women hung up in a jiffy. And there you are.

Of course the telephone books put a timelimit to party-line conversations, but these things happen frequently nevertheless.

TELEPHONIC SPEECH TRANSMISSION

A Paper read before the Liverpool, England, Telephone Society.

By B. S. Cohen.

TRANSMISSION is a subject which has only been developed on strictly scientific lines during the past few years. That a thorough study of transmission is of very great importance is, I think, generally conceded. A few figures, however, may be given to emphasize its value.

The National Telephone Company, London, has about 560,000 miles of cable line and 166,000 miles of open wire line laid in the United Kingdom. The copper in these lines amounts to about 19,000 tons, worth at the present rates about £1,501,000 for copper alone.

In a mile length of 400 pair cable, if the copper weight can be reduced from 20-lb. conductors down to 10-lb. by a proper study of the conditions, a saving in copper alone of £276 can be at once obtained, besides other big savings in duct space and handling. Now the introduction of 10-lb. cable has been due to the studies made in transmission.

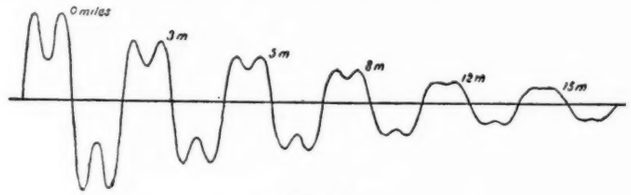


Figure 1a.

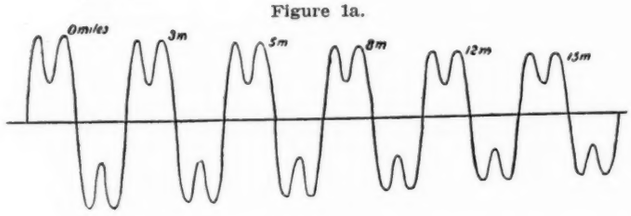


Figure 1b.

Note.—Figure 1b is merely used as an illustration of the beneficial action of distributed inductance, and must not be taken as advocating the loading of a fifteen-mile length of 20-lb. cable. It is quite possible that it would not pay to do this in practice.

The company has equipped a laboratory, and made many investigations on the subject of transmission during the past two years, and it is proposed to give in this paper a short *resumé* of some of the more important work done and the methods employed.

Although a knowledge of the fundamental laws which govern telephone transmission is becoming fairly widespread, yet it may be advisable to start with a rapid review of these laws.

It is impossible to compress into this short paper much about the theory of action of the various electrical conditions of a telephone line on the transmission efficiency, so that a few plain statements must suffice.

Capacity and resistance, distributed as they are in a telephone line, act harmfully on transmission; both tend to increase the attenuation, and capacity, besides, distorts the speech waves by attenuating and displacing unequally the waves of different frequency.

Figure 1*a* shows a compound wave, consisting of a fundamental of 800, and the third harmonic of 2.400 superimposed. The action of a length of fifteen miles of 20-lb. standard cable on this wave is shown.

The cable possesses capacity and resistance, and the attenuation is very marked (from 100 per cent down to about 20 per cent). The distortion is also very considerable. At fifteen miles the harmonic is practically wiped out.

Distributed inductance in combination with capacity and resistance acts beneficially in both decreasing the attenuation and the distortion.

Figure 1*b* shows the same wave and the same cable as in Figure 1*a*, but distributed inductance amounting to .2 henry per mile has been added.

Distortion has been practically annulled, and the attenuation greatly decreased. The amplitude at fifteen miles being now 71 per cent of the commencing amplitude, that is, the transmission is now roughly 4.7 times as good.

In Figure 1*a* it will be noticed that the third harmonic is practically wiped out at fifteen miles. It may be as well to mention that the transmission on fifteen miles of 20-lb. cable is very loud and articulate. In fact the practical limit is not reached until about forty-six miles of this type of cable is in circuit.

The probable explanation of this is that the upper harmonics of waves above 800 ~ do not play a very important part in articulation, and, indeed, 800 is taken generally as the upper limit of frequency which matters in speech waves.

With regard to leakage, it must be pointed out that low insulation resistance has a very detrimental effect on the transmission with heavy gauges of open wires, and the old statements regarding leaking lines talking better than high insulation ones must not be accepted without certain reservations.

There is no doubt that the transmission under certain conditions will be more articulate with a leaking line at the expense of volume, but for the types and average lengths of lines met with under practical conditions, the distortion, and, therefore, the articulation, is, generally speaking, of quite

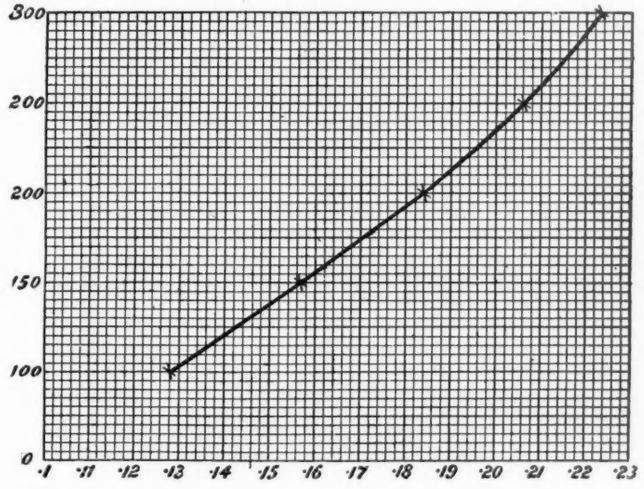


Figure 2.—Curve showing variation in attenuation constant by varying the resistance of the conductor in a light gauge cable where K = .07 microfarad and the inductance negligible.

secondary importance, and, consequently, everything depends on volume.

There are quite a large number of points, such as the actions of reflection and dissipation, and some little studied phenomena, which take place in the dielectric, such as absorption and dielectric hysteresis, which demand careful attention, but the mere mention of them must suffice here. Anyway, we have to bear in mind that the capacity and

resistance must be kept to a minimum and the inductance to a maximum, within certain limits, to get both clear and loud transmission, at the same time considering, from the practical standpoint, the increase in cost due to the reduction in capacity and resistance.

The laws which govern the action of resistance, capacity, etc., on the transmission are now pretty well known, and it is quite possible to easily and accurately work out the percentage volume of current at the far end of a telephone line of any type of non-magnetic conductor, provided no reflection troubles exist to complicate matters.

It must be remembered that cable lines, up to and including 40-lb. conductors, have practically negligible inductances, and, if in good condition, negligible leakages. The attenuation constant for such a line is obtained from the formulæ:

$$\beta = \sqrt{\tfrac{1}{2}\, p\, K\, R},$$

where $p = 2\pi n$ = about 5,000,
K = capacity in farads per mile (mutual),
R = resistance in ohms per mile,
N = frequency.

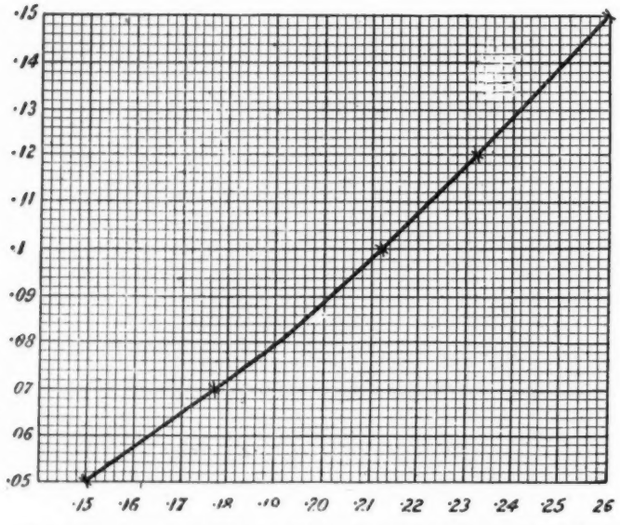


Figure 3.—Curve showing variation in attenuation constant by varying the capacity in a light cable where R = 190 ohms and the inductance negligible.

When inductance or leakage are present, the formula becomes somewhat more complex:

$$\beta = \sqrt{\tfrac{1}{2}\sqrt{(R^2 + p^2 L^2)(S^2 + p^2 K^2)} + \tfrac{1}{2}(RS - p^2 LK)}$$

here L is the inductance in henries per mile (mutual), and S is the leakage, *i. e.*, $\frac{1}{\text{insulation resistance}}$.

From the attenuation constant, the actual diminution in volume and the line equivalent can be calculated. Tables of equivalents for various types of open and cable wires have been published in circular letters and the correspondence classes. These have all been verified, both theoretically and by actual experiment.

These equivalents are the ratios of the attenuation constants of the line considered and the standard, thus the attenuation constant for the standard cable = .103, and for 100-lb. copper = .0122, so that equivalent = $\frac{.103}{.0122} = 8.45$, that is 8.45 miles of 100-lb. copper = one mile of 20-lb. cable.

The relationship between the current at the beginning and end of a line is determined from the attenuation constant by means of the following formula:

$$C_x = C_o\, e^{-\beta x}$$

where C_x = the current at the end of x miles of line,
C_o = the current at the beginning of the line (for relative purposes this can be taken as 100),
e = the base of Naperian logs. = 2·71828,
and β = attenuation constant.

For example: With an initial current of 100, the current at the end of a 46-mile line of 20-lb. cable = .91. Although

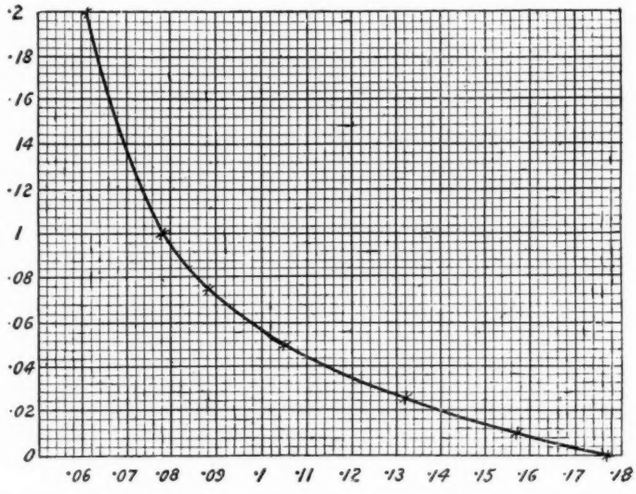


Figure 4.—Curve showing the variation in attenuation constant by varying the inductance in a light gauge cable where R = 190 ohms, K = .07 microfarad.

under 1 per cent of the current has reached the far end of this line, the transmission is still commercial, although close to the breakdown point.

The following is a simple method of obtaining the equivalent direct from the electrical constants for any gauge of cable wire in present type telephone cables (where inductance and leakage may be neglected) up to 40-lb. weight:

$$\text{Equivalent} = \frac{2{\cdot}18}{\sqrt{K\,R}}.$$

K = capacity in microfarads per mile loop.
R = resistance in ohms per mile loop.

Thus a cable with 84 ohms per mile resistance and .05 microfarads per mile capacity will have an equivalent = $\frac{2{\cdot}18}{\sqrt{\cdot 05 \times 85}} = 1{\cdot}065.$

It will be of interest to consider the relative effects of variation in any one of the electrical constants on the attenuation, and the ensuing series of curves were constructed to illustrate this as far as a light-gauge cable is concerned.

Figure 2 shows the effect of varying the resistance from 100 to 300 ohms. This curve at once shows the great importance of resistance as a factor in the attenuation, which is almost directly proportional to the resistance.

Figure 3 shows the effects of varying the capacity between .05 and .15 microfarad. Here, again, there is almost direct proportionality.

Figure 4 shows the effects of varying the inductance from 0 to .2 henry. It will be seen that up to about .08 henry the attenuation is approximately inversely proportional to the inductance, but that from .08 henry upwards the decrease in attenuation by increasing the inductance is not nearly so marked.

Figure 5 shows the relation between attenuation and leakage. Increasing the insulation resistance above 100,000 ohms does no good in this case, and a drop to 10,000 ohms is inappreciable. A turning point is almost reached, however, at 10,000 ohms, and anything below this gives very considerable attenuation.

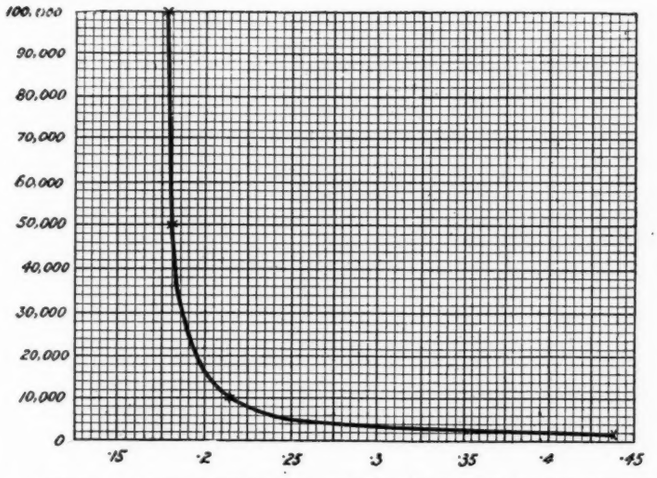


Figure 5.—Curve showing the variation in attenuation constant by varying the insulation resistance of a light gauge cable where R = 190 ohms and K = .07 microfarad.

Before leaving this part of the subject I should like to mention that the K R law, which states that the transmission efficiency depends entirely on the product of K and R, fails altogether when applied to the practical test.

As an example, it has been stated that the limiting distance of speech with open copper wires is given by a K R of 15,000, and that 10,000 must be taken as an easy and practical condition. Now there are many working lines which greatly exceed this, for example, the Boston-Omaha open wire toll line has a K R of something like 69,000, and the transmission is quite commercial.

I will now proceed to describe some of the apparatus used in connection with transmission tests in the telephone house laboratory.

In order to make transmission tests it is necessary to have the following reproducable standards:

(*a*) A pair of telephone instruments for transmitting and receiving.

(*b*) A standard telephone circuit.

(*c*) A standard line.

Having obtained these essentials it is still necessary to

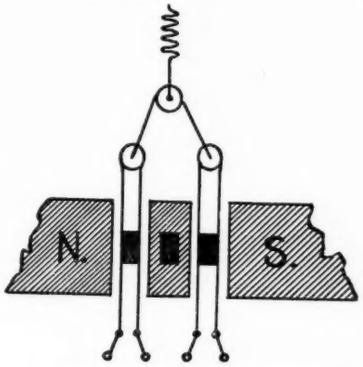


Fig. 6—Oscillograph, Magnet and Coils.

have a sound producer for transmitting, and a sound measurer for receiving.

For a final or check test the sound producer used is almost invariably the voice, and the sound measurer will be the ear. But these are nowadays supplemented by some very useful instruments which I will describe.

One form is a motor-driven interrupter, which makes and breaks a battery circuit either 100, 800, or 2,400 times per second. This interrupted battery circuit is passed through a receiver, and this will give a howl of which the intensity depends on the strength of the battery current. The receiver is fixed opposite the transmitter which it is desired to actuate. Another form of sound producer used is a small alternator, which produces a sine-shaped wave of about 800 ∿, and it is hoped that by the use of this instrument quite a number of important transmission questions will be solved.

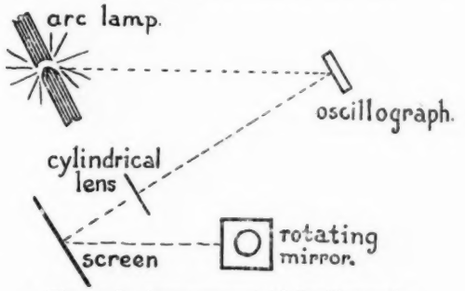


Figure 7—Arrangement of Oscillograph.

To supplement the results obtained by using the ear, two very useful instruments are being employed.

The first is the oscillograph.

Figure 6 illustrates the principle on which this instrument works.

Between the poles of a very powerful magnet, N. S., is fixed a piece of soft iron, so that a very intense magnetic

Figure 8—Falling Plate Photographic and Visual Outfits.

field exists in the two narrow gaps thus formed. In each narrow gap are stretched two parallel conductors of phosphor bronze, bent round a small ivory pulley. The tension is maintained and adjusted by means of a miniature spring balance. The clearance between the sides of the gap and the moving strips is only .038 m.m., and the gaps are filled with a damping oil, which varies in viscosity (and, in consequence, in damping effect) with the temperature.

The front of the gaps is closed in by a glass lens. Three minute mirrors are fastened, one on each strip, and one fixed to the center pole piece to form a zero line. The two

strips work quite independently of one another. The instrument thus forms practically two D'Arsonval galvanometers of very high frequency. The period of vibration of the instrument used by the company is only 1-10,000th of a second.

The heat generated by the exciting current for the field

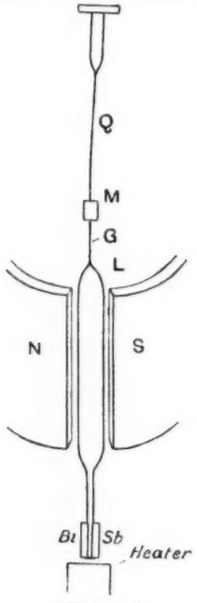


Figure 9.

magnet is used to vary the damping effect of the coil, and a small thermometer is fixed into the pole pieces to measure the temperature.

Figure 7 shows how the oscillograph is arranged.

A powerful beam of light from an arc lamp falls on the

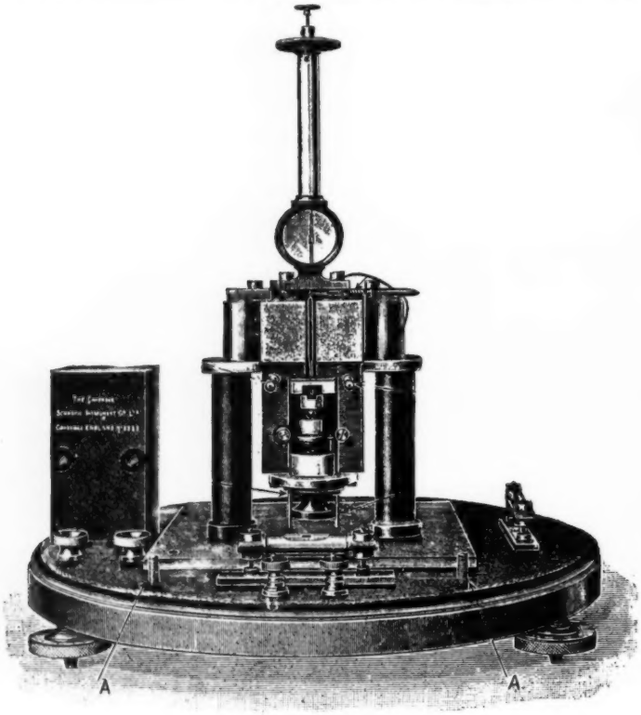


Figure 10.

oscillograph mirrors and is reflected as three slits of light on to a cylindrical lens, which converts the three slits into three spots which fall on a screen. The three spots can be made to coincide by a delicate adjustment on the oscillograph.

Now if an alternating current passes round one of the strips the mirror is vibrated to and fro and the spot of light is spread out into a line of light on the screen. If the reflection of this line is viewed in the rotating mirror, which is revolved at right angles to the motion of the oscillograph mirror (by means of a motor), an image of the actual waves is seen.

By means of a special device, a photographic plate can be

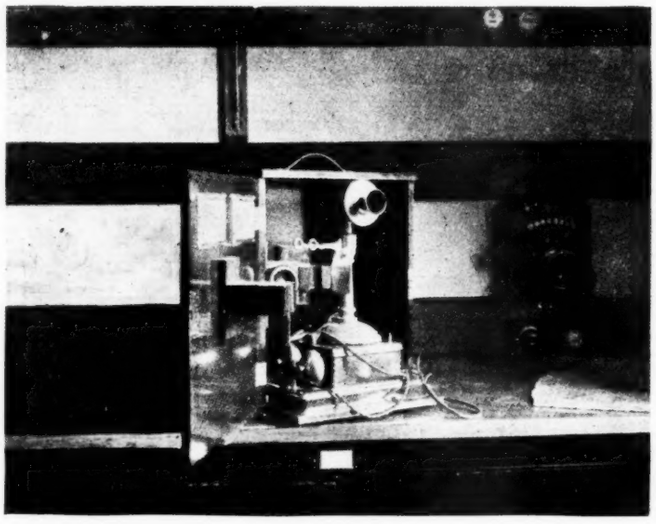


Figure 11.

released at any moment, and this falls in front of the screen and thus takes a permanent record of the waves.

Figure 8 shows a complete view of the whole instrument.

Some of the results obtained with this instrument will be referred to later on.

Another instrument used to measure telephone currents will now be described. This is the Thermal galvanometer, invented by Mr. Duddell, who also invented the oscillo-

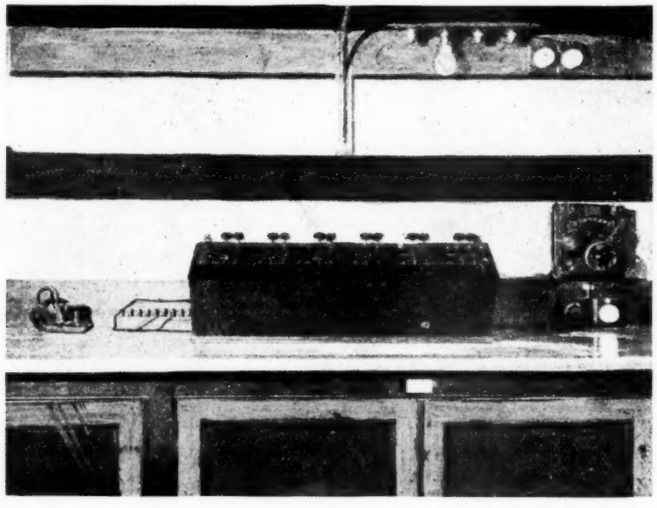


Figure 12.

graph. The principle on which this instrument works is quite simple.

Figure 9 shows this. Between the poles of a powerful permanent magnet, N. S., is suspended by a quartz fiber Q, and glass stem G, carrying a mirror M, a fine silver loop L forming the moving coil of a D'Arsonval galvanometer. The lower end of this loop consists of two little rods, one of antimony Sb and the other of bismuth Bi, soldered together at the bottom, thus forming a thermo-couple. Below the joint comes a piece of apparatus called the heater.

This consists of an extremely fine piece of platinum tube, which, although of short length, has a resistance of 100 ohms. The ends of this heater are brought out to terminals, and form the only external connections to the galvanometer. Any minute currents flowing through this heater raises its temperature, and, consequently, sets up a current in the thermo-couple, which, circulating in the silver loop, deflects the latter in the magnetic field.

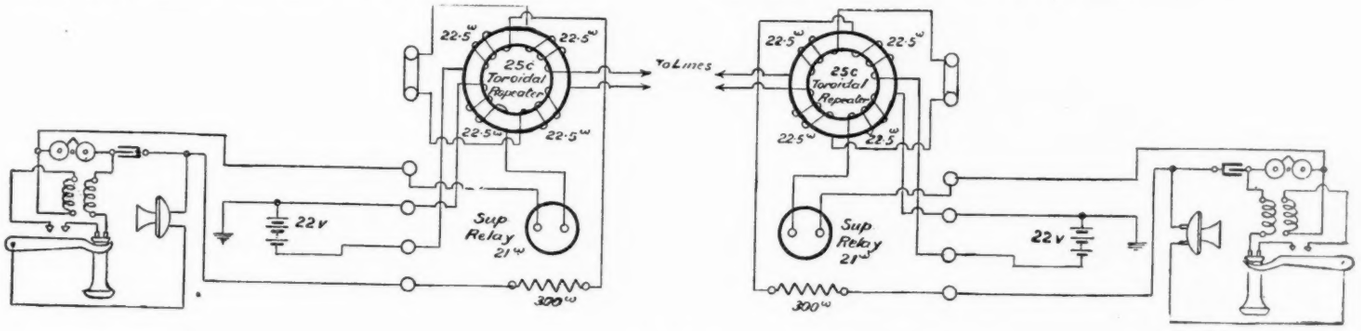


Figure 13.

This instrument is very nearly as sensitive as the telephone receiver, and gives its readings in R.M.S. values of the currents flowing, being quite independent of the wave form and frequency.

Figure 10 shows the complete instrument.

The instruments so far described, with the addition of a sensitive electrostatic voltmeter, are all used for measurement and investigation of telephone speech waves. It may now be of interest to describe the telephone standards that have been adopted.

Figure 11 shows one of the standard telephone instruments in its case. It is of the familiar central battery pedestal pattern, and is one of those tested and certified

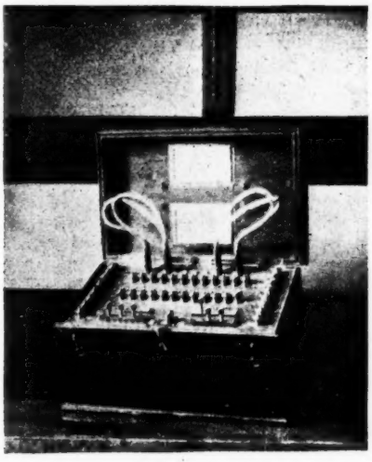


Figure 14.

jointly by the general postoffice and the National Telephone Company.

Now, turning to standard lines: Two cables have been installed for experimental purposes, one of these is a 612 pair cable, and gives thirty-two miles of 9½-lb. circuit by .1 mile intervals.

The other cable is 204 pair, and gives fifty-one miles of 20-lb. circuit, also by .1 mile intervals.

These cables are potheaded in the laboratory, and very short silk and cotton-covered leads take the ends on to devices by which, firstly, one mile intervals in the case of the 20-lb. cable and .5 mile intervals in the case of the 9.5 cable can be isolated, and secondly, any length of line can be inserted in circuit by depressing a key.

The 20-lb. cable is practically the test cable referred to in the agreement, and has an equivalent therefore of approximately 1. The 9½-lb. has an equivalent of .62.

In addition to these cables we have two portable artificial cables, and these are very useful to take about the country.

Figure 12 shows one of these cables complete. It is made up like a resistance box, and is equivalent to thirty-five miles of standard cable. It consists of a combination of non-inductive resistance coils and condensers.

Having now described the standard instruments and lines, all that is left is the standard circuit.

Figure 13 shows this circuit. This is the circuit which would be used when two central battery subscribers were talking over the trunks.

Figure 14 shows the circuit set up in a box which is arranged for comparison purposes.

The repeaters, relays, and resistance coils are mounted in-

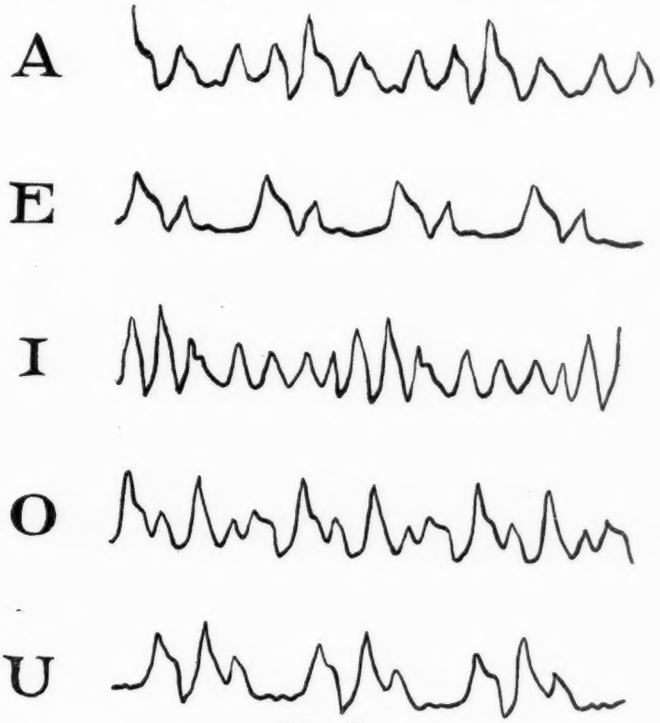


Figure 15.

side. Suppose it is required to obtain the equivalent of a certain line. By arranging the double-ended plugs, and connecting the line under test and a standard line for comparison purposes, to the various terminals, we can, by throwing a key from side to side, insert either line into circuit, and by varying the length of standard cable until a balance is obtained, we can at once obtain the equivalent. It is with the standards described, that the equivalents and tables issued in circular letters, etc., have been arrived at.

A few reproductions of photographs of telephone waves

obtained with the oscillograph may be of interest. The vowels *a, e, i, o, u* are shown in Figure 15. It must be pointed out that as the falling photographic plates only record for about 1-25th of a second, that it is difficult to get the beginning and end of any sound, so that continuous or

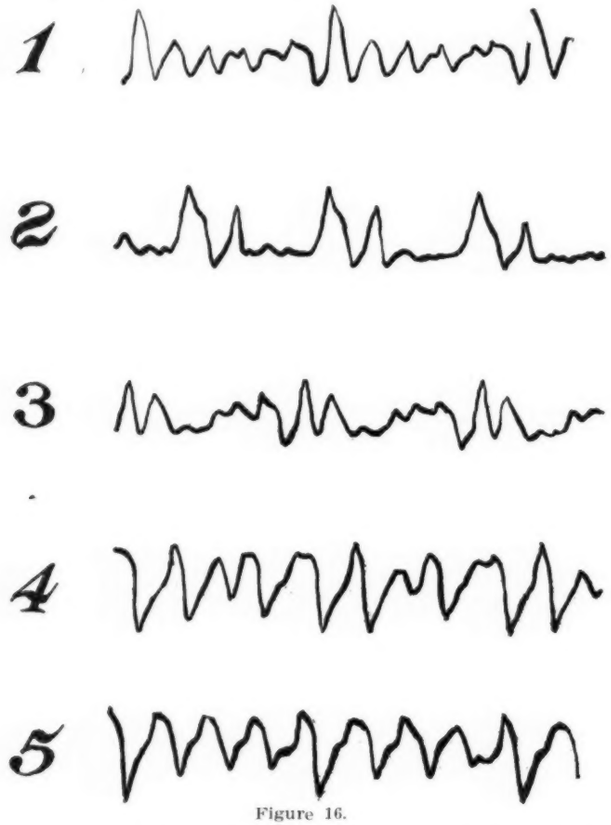


Figure 16.

rapidly repeated sounds are the best to record photographically with falling plates.

Figure 16 shows the numbers 1 to 5 repeated rapidly. The relatively big amplitudes of 4 and 5 are very noticeable. It is interesting to note that long before these photographs were made, the relative loudness with which the number 4 came out in the receiver when counting 1, 2, 3, 4, 5, had been observed.

Figure 17 shows that the oscillograph can be used to study the attenuation and distortion of telephone waves.

One of the vibrating strips is placed at the beginning and the other at the end of a 20-lb. cable line, 17.6 miles long.

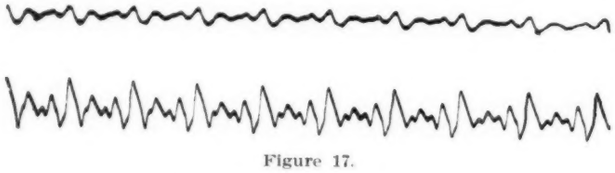


Figure 17.

The figures show the actual attenuation and distortion of part of the word "Hello," which was rapidly repeated.

The respective R.M.S. values of the amplitudes gives a measure of the attenuation.

The distorting action of the line is well seen in the rounding off of the sharper peaks.

Figure 18 shows the waves produced by a humming telephone, both in the receiver and transmitter circuits.

The humming was produced in the familiar manner by short circuiting the terminals of an ordinary local battery instrument, and placing the receiver earpiece close to the transmitter mouthpiece. The wave is very regular and approximately sinusoidal in form.

The photographs have been picked out from a large number, as being of the most general interest, and as serving to show the possibilities of this beautiful instrument.

It is quite possible to use iron wire for telephonic transmission purposes, and it is conceivable that under certain conditions it would pay to do so. A few figures may be of interest:

Four hundred-pound iron wire: Values of electrical constants with steady current, show 24 ohms per mile resistance; .019 henry per mile inductance. With 750 ∿ alternating current, 49 ohms per mile; .0034 henry per mile.

$$\text{Equivalent} = \frac{.103}{.0203} = 5.$$

So that a 400-lb. iron wire has about the same transmission efficiency as a wire between a 70-lb. bronze and a 100-lb copper.

Figure 19 will serve to illustrate the complexity of the

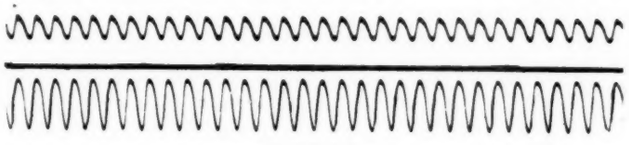


Figure 18.

phenomena which takes place in the telephone circuit. This shows the relationship between the transmitted and received current over varying mileages of 20-lb. cable connected in a standard circuit. It will be seen that up to about eleven miles the received current is actually greater than the transmitted, and thus it is only after this distance has been exceeded that the currents follow the ordinary attenuation laws. This, of course, does not mean that the power at the receiving end was necessarily greater than at the transmitting end, as a considerable difference in phase between the current and pressure may exist at the receiving end. These figures were obtained by means of the thermo-galvanometer, and similar results have been obtained with the oscillograph.

This peculiar effect is due to the reflected waves from the receiving instrument interfering to some extent with the

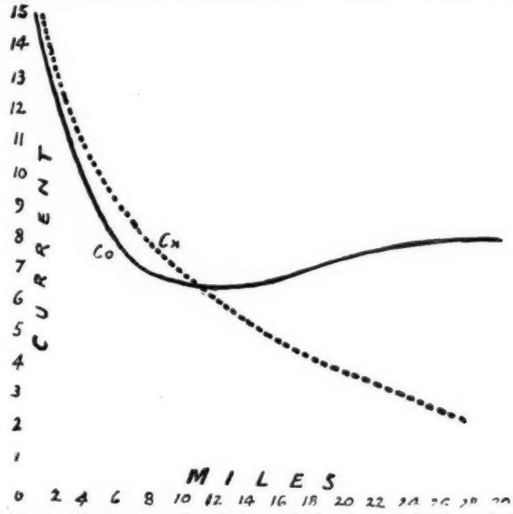


Figure 19—Curve showing variations of Initial and Final Currents on Standard Junction Circuit when length of 20 lb. cable is altered. Line shows initial current. Dots show final current.

direct waves. This interference gradually decreasing as the distance from the receiving instrument decreases.

It is interesting to note that curves drawn by Mr. G. M. Shepherd from calculations he has made, allowing for the impedance of the terminal instruments, are practically identical with Figure 19.

The attenuation of a number of cable lines in parallel

should be the same as for a single line, provided that nothing need be considered but the ordinary attenuation laws, for as each line is added in parallel, K increases and R decreases by a proportionate amount. By actual test, however, it is found that two lines in parallel are actually worse than one line. For example, two 12 m. lengths of 20-lb. cable in parallel showed twenty-seven per cent more attenuation than a single line, and 4 — 12 m. lengths in parallel showed fifty-five per cent more attenuation than a single one.

This is due to the fact that the impedance of two lines in parallel is half that of one line, and, consequently, a greater load is placed on the transmitting induction coil or translator, which causes a drop in the P.D., and thus an actual reduction in the current received by the instrument.

By measuring the P.D. across a translator secondary, this has been proved, as the P. D. of the speech waves, under certain conditions, with a single length of cable, was 3.8 volts, and with two lengths in parallel it dropped to 2.2 volts. As illustrating the ignorance which seems to prevail on such important points as this one, it has frequently been suggested that the talking efficiency of a long cable line might be increased by using pairs in parallel.

A few particulars regarding efficiencies of different systems may be of interest.

The Western Electric common battery system has the highest all-round efficiency of any which the company has measured, and taking it at 100 per cent, we get for the local battery system, with hand microtelephones and cells in the average condition, seventy per cent efficiency. The same system with the H.M.T., replaced by a fixed Ericsson transmitter, has an efficiency of about ninety per cent.

There has lately been quite an epidemic of patent earpieces and mouthpieces, claiming hygienic or transmission advantages, and while on the best of them the hygienic advantages are, to say the least, doubtful, there has been in every case tested very considerable decrease in transmission efficiency. One arrangement for which secrecy was claimed, on the ground that it was only necessary to whisper into the patent mouthpiece, actually reduced the efficiency by 20 per cent, so that it was really necessary to talk louder.

The prevalence of such apparatus and their accompanying fairy tales, has been very likely due to the absence of definite and scientific testing arrangements in the past.

To conclude, I must express my indebtedness to Messrs. Coote, Shepherd, Aldridge, and Stiles, who have been engaged for some time with me in carrying out transmission investigations.

THE TELEPHONE HOAX.

Philadelphia is at present the seat and center of the latest telephone hoax which the misguided youth of the country insist upon springing, in some form or other, every once in a while, in a kind of cycle of cities.

Six years ago, as we remember it, this thing originated in New York. A gentleman came to his office to find a little memorandum on his desk, asking him to call up Mr. Fish, at such and such a number. It soon developed that the Mr. Fish who lived at the number indicated moved about with tail and fins and was in multitudinous evidence in the aquarium.

The young lady—if, indeed, she was young—who answered the telephone down there, where the bass and the carp, and the jelly fish and star fish, and the lamprey eel and the turtle all live together in one happy family, got very, very weary of answering people who called up to inquire if Mr. Fish wished to speak to them, and the chances are—in fact the established evidence is—that she sometimes said as much in terms as unparliamentary as ladylikeness would allow.

In course of time the novelty wore off, and there were no more calls for Mr. Fish.

Only a few months ago the the same hoaxical fad broke loose down in Atlanta, Georgia. Miss Maud was the lady in the case. Miss Maud is the elephant at one of Atlanta's parks.

This had the redeeming feature that the new joke was in reality sprung on and shortly after the first of April.

But Philadelphia is, as we have said, in the midst of the most maddening and contagious hoax the country has yet seen. The unsuspecting victim is asked to call up Miss Kitty, at a given number, who, it was supposed, wanted to speak to him.

If she had done so it would have been in the form of a mew, for it was none other than the refuge for homeless cats.

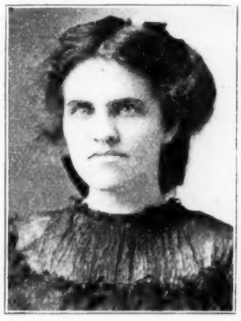
It is one of the pet institutions of the city, so to speak. It is matronized by a number of leaders who are prominent in Quaker City society. So far as we are informed, they are not all old maids. They seem to be merely stirred by humanitarian instincts. Their hearts are touched by the wails of midnight tommies and tabbies, and they want to see them safely housed. It is quite an institution—this refuge for cats—and is well endowed and protected.

So not only the young lady at the telephone, but those all over the city who have become responsible for its welfare, felt aggrieved and hurt when this hoax was started.

The whole town is very much wrought up, and it is rather a dangerous matter to tell a man that Miss Kitty wants to speak to him over the telephone.

WOMAN MANAGES TELEPHONE SYSTEM.

Miss Grace Armstrong, manager of the Voorhies (Iowa) Mutual Telephone Company, is one of the busiest women in the Hawkeye state. She operates the switchboard supplying 125 patrons, does the collecting, and, besides is the "trouble-hunter" and "lineman" of the system. What is more, she says she enjoys the work and would not trade places with any woman of idleness and ease in the country. When trouble is reported along a line Miss Armstrong saddles her pony, straps a kit of lineman's tools to her saddle bow and gallops to the rescue. Generally the trouble is produced by "crosses," and she carries a long pole with which she repairs the damage. If necessary however, she is willing to don climbers and mount the telephone pole.



Miss Grace Armstrong.

Her pony is trained to stand quiet and enable her to finish the repairing job just as the "cayuse" of the cowboy cooperates in the roping of a steer. Miss Armstrong also has a working knowledge of the construction end of the business and supervises all extensions. The central switchboard of the company is located in her own home, which enables her to attend to night business as well as day calls. She does her collecting every quarter. Her younger sister —Miss Armstrong is only 23—runs the office while she is making her trips.

That the patrons of the Voorhies Mutual Telephone Co. —which is an Independent, of course—are perfectly satisfied with Miss Armstrong's management is evidenced by her naive remark: "The best part of my work is that every patron is kindness personified to me. They all try to make my work as light as possible." Miss Armstrong has had several offers to engage in telephone work in a larger field, but she is so interested in the Voorhies exchange she has developed that she is loath to leave.

DIGEST OF TELEPHONE PATENTS

By Edward E. Clement

825,894. Telephone System; Dean. This is a three wire system having a battery bridged between two of the wires for talking current and a generator connected with the other line and the ground to supply ringing current. Each substation is grounded and a relay is provided to connect the generator with the substation after the battery has operated it. Patent assigned to Kellogg Switchboard and Supply Company.

826,220. Telephone System; Beaver. In this invention there is a main line and an additional line parallel thereto and in inductive relation therewith. The instruments at the several substations are usually disconnected from their respective lines except when in immediate use. Patent unassigned.

826,310. Automatic Telephone Exchange System; Bullard. The drawing in this patent shows a local circuit at the exchange having included therein the stepping and retaining magnets of the selector switch, and a relay controlled at the substation for completing the connection of the line to the selector switch. A shunt around the stepping magnet is established in response to the energization of the connecting relay. Patent assigned to Western Electric Company.

826,317. Selective Signaling System; Dean. This is a selective signaling system which employs a series of electromagnets progressively excited to signal the respective substations. Combined with each of the magnets is an interference device operating to prevent the control or operation of the signals lower in the series. Patent assigned to the Western Electric Company.

826,336. Card Holder for Telephone Transmitters; Kilpatrick. This invention comprises a stamped metal clip formed up out of a single metal plate, which is provided with an aperture through which the mouth piece of the transmitter is inserted so as to clamp the clip between the raised collar of the transmitter front and the mouth piece. Patent assigned to Western Electric Company.

826,350. Selector for Automatic Telephone Exchanges; McQuarrie. This is a selector switch for automatic exchanges which has its contacts arranged circumferencially around a base and a rotary operating contact arm having a pair of contacts swept around by suitable stepping magnets. Patent assigned to Western Electric Company.

826,457. Electric Signaling System; Webb & Fredrickson. This invention comprises improvements in semaphore and telegraph signaling systems whereby connection may be made from the central station to all other stations in circuit to permit signaling between the central station and all the others at the same time. Fredrickson assignor to Webb.

826,534. Telephone Systems; C. G. and E. G. Burk. In this system an electrolytic cell is placed in shunt with the line and in series with the battery and transmitter so as to increase the e. m. f. of the battery as the transmitter resistance is varied by the voice vibrations. Assignors of one-half to John Q. A. Whittemore.

826,542. Telephone Transmitter; Clement. In the drawings of this patent, which shows the Standard Dean transmitter, the main diaphragm is shown punched out so as to form a flanged central opening. The projecting flange of the carbon button rests upon the flange of the diaphragm with the button extending through the aperture and flush with the outer face of the diaphragm. Patent assigned to the Dean Electric Company.

826,680. Multiple Switchboard Construction; Merritt. In this invention the switchboard is shown in several sections so as to be in a way isolated from one another which are adapted to prevent the spread of fire from one to another which frequently occurs at the cord shelf. Patent assigned to New York Telephone Company.

826,686. Telephone Support; Oliver. This is an adjustable telephone support for desks, tables and the like. It employs a radially and vertically swinging arm normally held in the vertical position and out of the way by spring pressure. Patent assigned to Oliver Manufacturing Company.

826,938. Telephone Attachment; Howe. This is a device for supporting the receiver in proper position at the speaker's ear, and comprises a bent arm extending out from the wall set, upon which the receiver is carried adjustably The receiver may be turned upon the supporting arm so as to be used for either the left or the right ear. The pressure of the head against the receiver moves the arm to operate a circuit closing device. Patent unassigned.

827,087. Harmonic Signaling for Party Lines; Dean. This is a harmonic signaling system for party lines which employs a series of generators at the exchange of different frequencies and voltages, condensers at the substations of different capacities, and ringers in series with the condensers operating upon currents of different frequencies. Patent assigned to Dean Electric Company.

827,449. Telephony; Kitsee. In this system there are employed induction condensers having their primaries connected to the main line and their secondaries included in the substation circuits and inductively connected to the lines through the condensers. Patent unassigned.

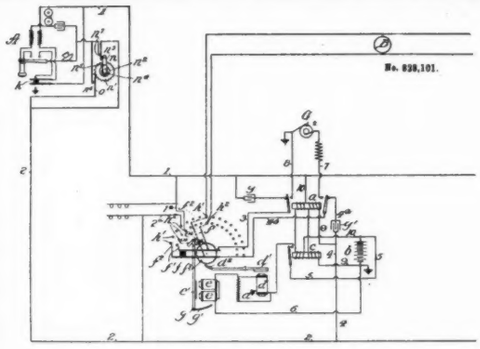
827,576. Telephone attachment; Smith. In this case the receiver has a cord connected to a sprint operated drum and running through a switch hook so that when it is released it rises to normal position and breaks the connection. Patent unassigned.

827,625. Telephone Transmitter; Gilchrest. In this instrument the front electrode is secured directly to the main diaphragm and a cup shaped bridge is also secured to the diaphragm by the usual rubber band. These parts are separated by an insulating ring. The rear electrode is secured to the bridge and a felt washer surrounds both electrodes between the diaphragm and the bridge. Patent assigned to Western Electric Company.

827,692. Desk Telephone; Houghton. This patent shows a base upon which is secured a rotary head having adjustable parallel arms extending therefrom upon which are supported the transmitter, the switchbox, and the receiver hook. Patent assigned to the Wire and Telephone Company of America.

827,719. Ear Muffle; Engelman and Partenheimer. This patent shows a cup or body of rubber having a throat constituting an outwardly extending cylindrical portion in which a lead pencil may be secured for a handle. The device is adapted to be used to shut foreign and disturbing sounds from the ear. Patent unassigned.

827,787. Telephone System; Corwin. In this system a current supply for the line travels through the line relay,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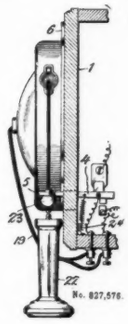
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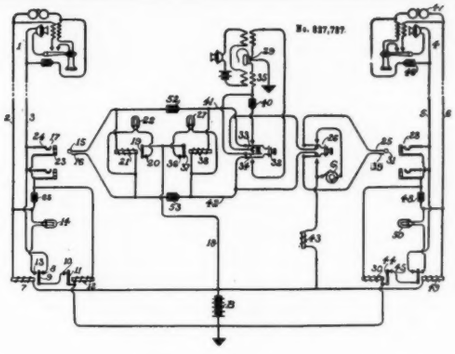
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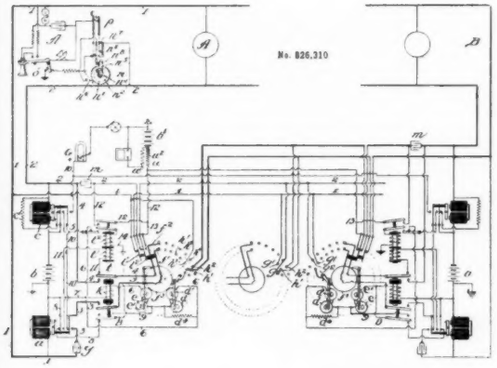
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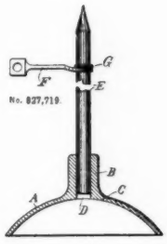
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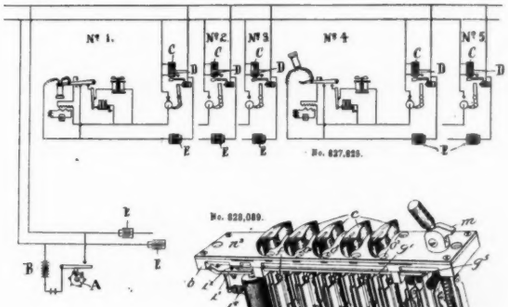
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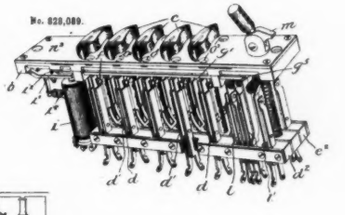
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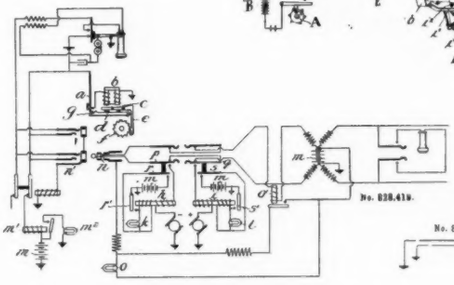
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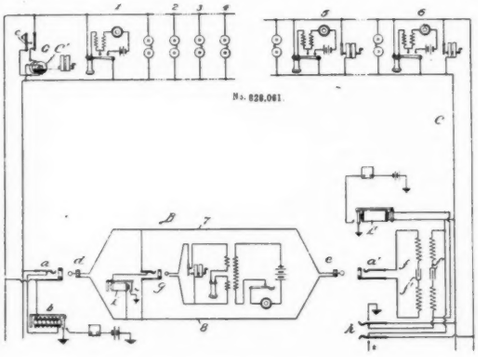
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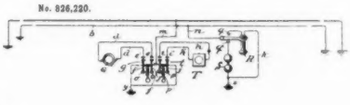
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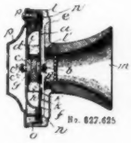
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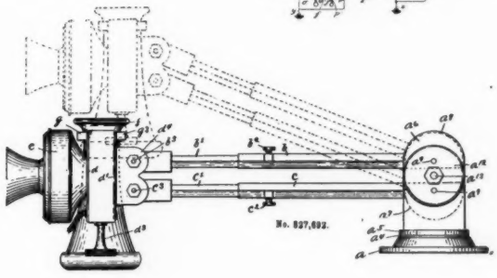
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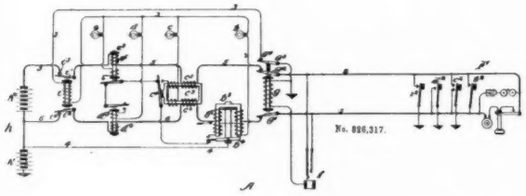
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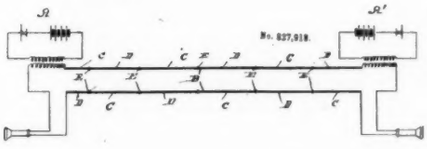
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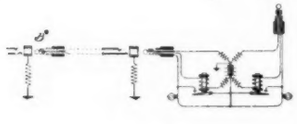

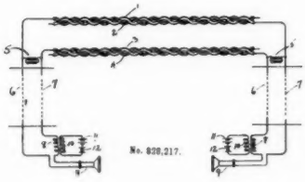
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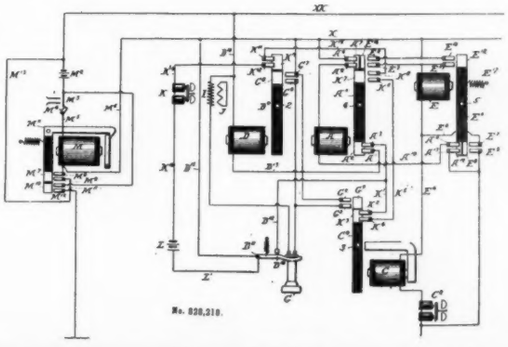
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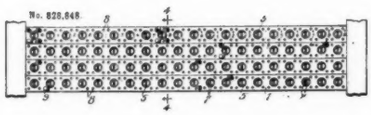

No. 828,848.

cut-off relay and supervisory relay in series, but the fluctuating speech current passes through condensers from line to line, but not through any winding of any relay. Patent assigned to Monarch Telephone Manufacturing Company.

827,825. Party Line System of Telephones; Stocks. This system, which was invented by a resident of Manchester, England, employs means for changing the control of a line and its associated apparatus from the operator to the subscriber if necessary, but all the claims in the case are directed to the switch which is used. Patent unassigned.

827,918. Electric Circuit; Kitsee. This is a local battery system in which the line is composed of alternate sections of a paramagnetic material and a nonmagnetic material. The nonmagnetic material sections may be twice as long as the magnetic material sections, but the sections should be so arranged as to have the material alternate on opposite lines. Patent unassigned.

828,101. Automatic Telephone Exchange; Enochs. In this invention two double wound non-polarized relays are employed, one for controlling the selecting mechanism and one for controlling the ringing generator, the relays being so connected in the circuit that one winding of each is between the battery and the line. When the subscriber operates his interrupter the circuit through the relays is interrupted with the result that the ringing relay being differentially wound is not operated, but the cumulatively wound selecting relay is operated. Patent assigned to Western Electric Company.

828,061. Telephone Exchange System; Scribner. In this invention each toll line is provided with a blocking device or barrier to signaling currents which is interposed between the spring jack and the toll line and comprises a repeating coil having condensers between the windings thereof. Patent assigned to Western Electric Company.

828,089. Switch Key; Craft. This is an operator's selective key for party line exchanges. When either one of the keys are operated in the set an electro-magnet operates a blocking device to lock the actuated key in its abnormal position. When the proper signal has been sent the current is taken off the magnet to release the blocking device and restore the apparatus to normal. Patent assigned to Western Electric Company.

828,217. Electric Transmission of Intelligence; Kitsee. In this invention the two legs of the telephone line are joined by a resistance and inductive circuit comprising four wires divided into two pair, one wire of each pair being connected to said resistance. Patent unassigned.

828,218. Telephone Apparatus; Kohn. This is a lock-out system of an extremely complicated nature, and of the step-by-step type, employing magnets serially energized so that the proper party may be called and all other parties being cut out. All the receivers are in open circuits until a subscriber calls or is called, when his receiver circuit will be closed and all other receiver circuits on the line prevented from being closed until that conversation is finished and central has restored the line to normal. Assignor of one-half to Louis A. Ksensky.

828,235. Call System; McCullom. This is a system for factory use or the like, in which all of the bells are rung at once. A complicated circuit breaker at central is used to give distinctive signals when different parties in different parts of the factory are wanted. Assignor of one-third to F. Eliot Low, of Paterson, N. J.

828,271. Telephone Apparatus; Bucklin. This is a lock-out system for party line service in which each sub-station is provided with what are termed disabling devices that are operated at all sub-stations by a series of impulses transmitted to all sub-stations except the one in use. Assigned to Barbara J. Francis.

828,292. Pocket Audiphone; Schneider. This device includes a receiver flexibly connected to a casing which includes the transmitter and the battery. A peculiar cord is used to connect the transmitter and receiver, one strand of which is complete and the other is broken and has a plug and socket connection. Patent unassigned.

828,368. Electric Signaling Device; Bascom. This is a ringer employing a pair of coils one of which is connected in the battery circuit the other of which being entirely independent thereof. The armature is normally held against the core of the magnet within the circuit and adapted to be attracted to the other coil upon cessation of current in the first coil. Assignor of one-half to John F. Hemenway.

828,419. Register Signal for Measured Service Telephone Exchange Systems; McBerty. This invention relates to pay station systems and the apparatus for collecting a coin at each sub-station, which includes a sub-station meter and a locking relay for the operator, the construction and arrangement being such that when the operator sends current to cause the register or coin collector to move or operate in any particular way she will receive a signal back indicating that the work has been performed. There are also means for preventing a repetition of the operation of the signal back indicator. Assigned to Western Electric Company.

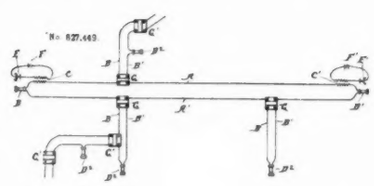
828,683. Telephone Exchange System; Rugh. This is a signaling system employing a peculiarly arranged signaling circuit in which the induction coils and the conductors including the same are formed in inductively related circuits, to which end the primary coils are directly connected in series, as are also the secondary coils, which result is effective when the ringing key is operated. A relay is serially included in circuit with the two conductors which upon organization effects the result above named, that is it serves to connect the coils of the primary together and the coils of the secondary together. Patent unassigned.

828,693. Telephone System; Webster. In this system a cut off relay is legged to the ground from one side of the line and a ground branch is connected from the same side of line through the normal contacts of the relay. An artificial resistance is interposed between the connections of said cut off relay and said branch with the line so that when a connection is established with the line the relay is caused to operate, the current thereafter traveling through one armature of the relay to the tip side of line instead of through the resistance or ground branch. Patent assigned to Kellogg Switchboard and Supply Company.

828,835. Wall Set; Birsfield. This is a self-contained wall set having its box punched up out of sheet metal with the ringer and bells supported upon a yoke piece and a condenser and contact terminals supported just below on the casing. The transmitter is carried by the casing so that all can be removed as a whole from the base to which the casing is attached. Patent assigned to Stromberg-Carlson Telephone Manufacturing Company.

828,848. Telephone Switchboard; Haubrich. This is a telephone switchboard having a plurality of plug holes adjacent to line jacks in which pins having different colored heads may be inserted to indicate the condition of the subscriber's line. Patent assigned to Stromberg-Carlson Telephone Manufacturing Company.

828,866. Party Line Telephone Exchange System; Stigberg. At the sub-station in this system there are used an alternating current relay, a common conductor and a polarized relay adapted for connection between the other line limb and the common conductor. The alternating current relay controls the circuit through the polarized relay and it in return when energized connects the signal bell between the common conductor and the line limb to which the alternating current conductor is connected. The operation of a selective key will simultaneously put alternating current and battery current into opposite limbs of the line, thus operating both relays and ringing the signal bell. Patent assigned to Stromberg-Carlson Telephone Manufacturing Company.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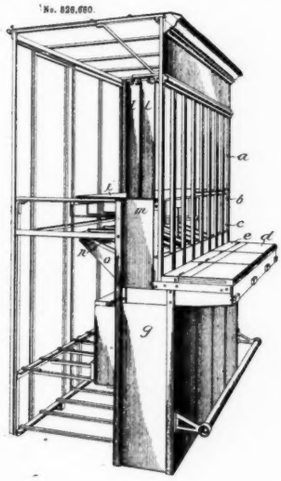
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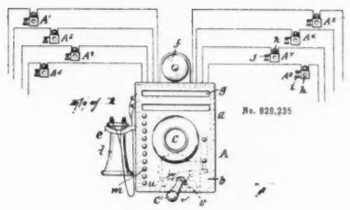
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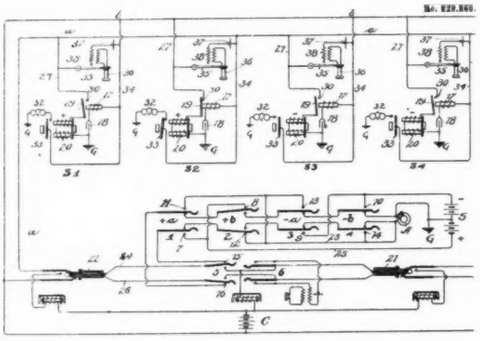
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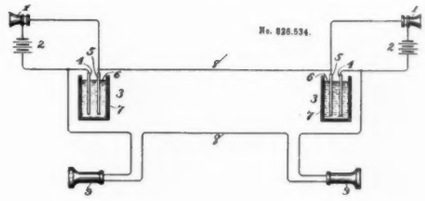
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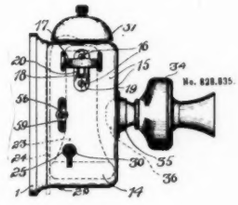
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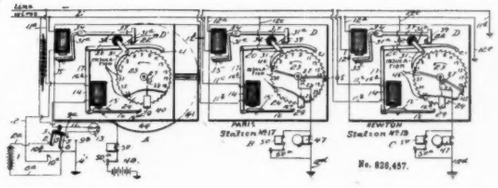
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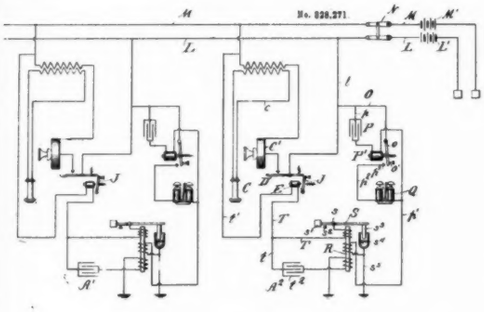
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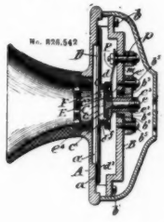
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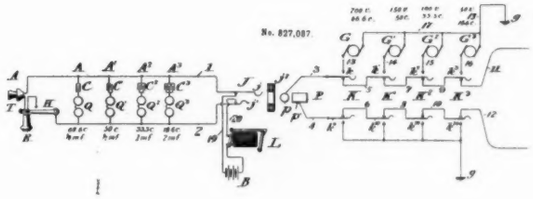
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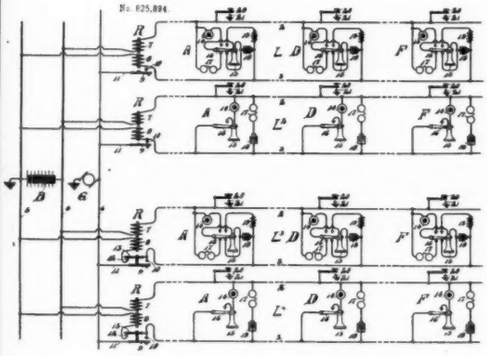
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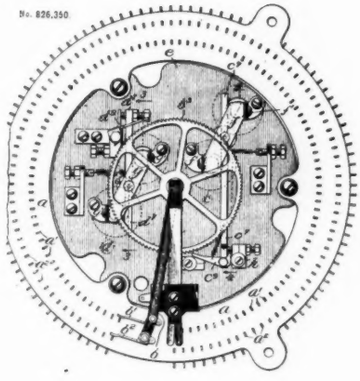
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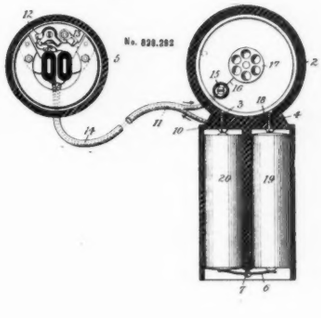
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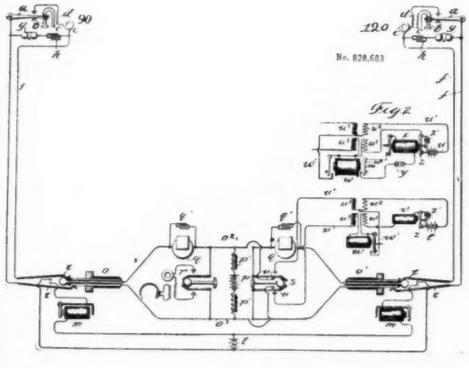
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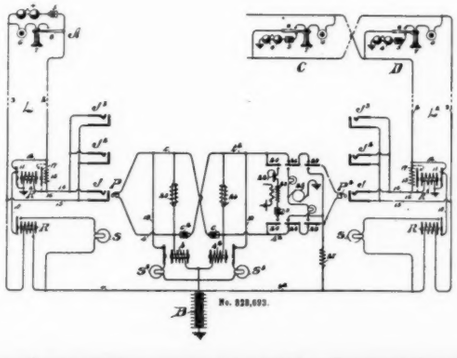
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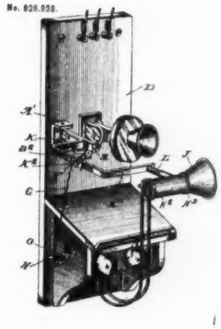
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CONCERNING TELEPHONE WIRES AND TELEPHONE WINDINGS

By Samuel G. McMeen

IT may be said that this is the bronze age, if it is the electrical view of materials which is taken, for "bronze" is a term which rightly may designate copper with or without alloy of other metal, and in electrical uses there is an enormous consumption of copper, not only in the pure state for lines and windings, but in combination with zinc to form brass; with zinc and nickel to form German silver, and even with tin, phosphorus and other materials to form special bronzes for more limited uses.

It is extremely fortunate for the electrical arts that copper is reasonably plentiful in the earth, for it possesses two necessary qualities to fit it for use as an uncovered aerial line conductor. It has almost the highest conductivity of known materials, silver being the only substance which exceeds it, and this only in a very slight degree. It does not waste away by the action of the elements in any excessive degree, being practically everlasting unless exposed to special corrosive influences not widely prevalent.

Iron or steel wire unprotected by some external covering rapidly wastes away, when strung in the open air, by the simple process of rusting. Even the galvanizing process, which coats the wire with a covering of zinc, is not serviceable where the wires are exposed to the action of sulphurous acid gas and other attendant gases and liquids which are present in the air in regions where much soft coal is consumed or where smelting operations take place. As soon as the thin covering of zinc has become dissolved and washed away by the rain, the iron or steel so exposed is vigorously attacked and the wire is soon unable to bear more than its own weight and good joints are impossible when it has broken.

Even though the conductivity and wearing qualities of copper were recognized from the earliest uses of metals for line wires, it was for long impossible to utilize it for the reason that when hung on supports a reasonable distance apart, the ductility of the metal, which had made the wire so easy to draw, annoyingly allowed it to stretch so much as to introduce crosses beyond the limit of possible permission.

It was in the period between the beginning of a demand for copper line wires and the finding of a way to provide them that wires with iron or steel cores and copper surfaces were somewhat widely exploited. Such wires can be made by two processes; one of them involves plating copper upon an iron or steel core and afterward perhaps passing the composite conductor through a die; the other involves making a rod by placing a steel core in a copper tube and then drawing this compound unit into a greater length of smaller diameter. Wires of both kinds have been strung for use and have given satisfactory results, but with neither is there an absolute certainty of the resulting conductivity and the resulting complete protection of the iron core within. In both there is involved a larger cost of labor than in making the wire of a single metal, so that the production of such a compound conductor did not wholly quench the desire for a solid copper wire capable of supporting its own weight and more.

Through the efforts of Mr. Thos. B. Doolittle the process of copper wire drawing has been perfected to its present satisfactory state. Mr. Doolittle, in his study of the problem, realized that it was the final softening of the copper wire after its repeated hardening processes during manufacture, which unfitted it for the service it had to perform. Starting with a copper rod to be made into a fine wire by successively pulling it through small holes in steel blocks, each hole smaller than the preceding, a long, thin wire results. In each such drawing through a hole the wire is reduced in size and increased in length, and although it may enter the hole soft, it emerges much harder. The pull required to break it in this state is greater than before such hardening and the ductility or ease by which it may be drawn to a finer size is much reduced. By heating the hardened wire, and allowing it to cool either slowly or quickly, its softness is restored and this previously had been done clear up to the end of the process.

In making copper wire for open line uses some or all of the annealing process may be omitted, with the result that the copper wire as supplied for use is hard, particularly on its outer surface. For his service in this important matter Mr. Doolittle was given a medal of the Franklin Institute.

In all matters having to do with the distribution of electricity in suitable quantities for power purposes, facts enough have bene collected and laws enough deduced to enable line circuits to be calculated with a very satisfactory exactness. Such a balance has been struck between the limits of fuel, labor and material costs as to enable the most economical character of line construction to be determined for any given set of facts.

Unfortunately, this ideal condition does not exist with reference to telephone lines, for even with the considerable addition which has been made to our exact knowledge of telephone transmission currents, the greater mass of fact available to the engineer is that which has been furnished by experience, and among the elements of which there is even yet no wholly exact agreement. About the best that can be done is to determine by patient comparisons of actual examples what may be expected under similar conditions in any other case. With this, and the exercise of judgment, a fair approach may be made to the solution of a specific case.

The nearest parallel to the problem of long distance voice transmission is a long distance alternating-current transmission line, but with the latter the amount of loss which is to be permitted is determined in advance wholly as a matter of financial economy, and with wise planning losses are permitted because it pays to allow them. In voice transmission, however, there is no loss which can be made up for by providing a larger power at the sending end. With transmitters as they are, lines must be adapted successfully to carry to the distant end such currents as the subscriber voluntarily may send into them, and it is easily to be foreseen what will be the commercial success of a transmission which compels the patron to speak unduly loudly. The result which must be achieved in voice transmission is the production of a thing or a system of things which will enable the wires of a long distance pair to be small in diameter, to be placed close together and still to deliver at the distant end a larger portion of the impressed current than now is possible even with large wires and considerable separation, and a considerable height above the earth.

Something has been done in this direction by the contribution of Dr. Pupin in the way of inserting serious induc-

tances in the wires of the line, and possibly a real benefit has been conferred by Mr. Shreeve in his telephone repeater. But these are proprietary applications, not yet open to the general uses of the public, and there is still much to be gained by the development of other methods or further extensions of these.

I have said as much at other times in these columns, yet it seems to me the subject is not trite, and that there is no other field for study and experiment which offers so great a reward to the telephone student and investigator. The result most likely will come as a consequence of a still more thorough study into the character of voice waves and the relations of the capacity and inductance of the circuit.

In the practical use of copper wires for line purposes in any of the electrical arts, a common difficulty lies in the fact that there are a number of wire gauges used to designate the different size of wires, and no one of the gauges is sufficiently flexible to have become universal. In the main, the reason for a variety of wire gauges being in use is that various wire manufacturers have adopted gauges for their own use, and so inflicted the disadvantages of the chosen gauges upon their customers. Though there are several wire guage systems, none of them has sizes close enough together to fit every condition which may arise, and if one clings to a single standard wire gauge he will find the size of wire desired for a certain purpose often to lie between two standard sizes of the gauge in use.

Fortunately, however, one may buy hard drawn copper wire of any size in any of the gauges, and by having all of them accessible much smaller concessions need to be made than if only one system could be used.

There is so much inconvenience in referring to a variety of tables, keeping up the process of mental comparison while doing so, that a table combining many of the sizes from the various gauges in one tabulation is found of considerable value. Table 1 herewith does just this, giving all the sizes from No. 8 of the Birmingham wire gauge, as the largest size, down to No. 14 of the New British Standard wire gauge, as the smallest. These sizes cover all the diameters usually required for open wire telephone line construction, as no lines have as yet been built larger than 435 pounds per mile of wire, and smaller than 102 pounds per mile of wire is not good practice on account of the lack of strength below that gauge.

SIZES OF COPPER WIRE

Suitable for Bare Line Construction, in Various Standard Sizes, Arranged in Order of Size.

Number.	Diameter in Mils.	Weight per Mile in Pounds.	Resistance per Mile of Wire in Ohms – 60°F.	Resistance per Mile of Loop in Ohms – 60°F.
8 B. W. G.	165.	435.	1.9742	3.9484
6 B. & S. G.	162.	419.	2.0481	4.0962
8 N. B. S. G.	160.	409.	2.0998	4.1996
9 B. W. G.	148.	350.	2.4541	4.9082
7 B. & S. G.	144.3	331.	2.5925	5.1850
9 N. B. S. G.	144.	331.	2.5925	5.1850
10 B. W. G.	134.	287.	2.9838	5.9876
8 B. & S G.	128.5	262.	3.2810	6.5620
10 N. B. S. G.	128.	262.	3.2810	6.5620
11 B. W. G.	120.	230.	3.7330	7.4660
11 N. B. S. G.	116.	215.	3.9948	7.9896
9 B. & S. G.	114.4	208.	4.1363	8.2726
12 B. W. G.	109.	190.	4.5244	9.0488
12 N. B S. G.	104.	173.	4.9701	9.9402
10 B. & S. G.	101.9	166.	5.1665	10.3330
13 B. W. G.	95.	144.	5.9558	11.9116
13 N. B. S. G.	92.	135.	6.3518	12.7036
11 B. & S. G.	90.74	132.	6.4891	12.9782
14 B. W. G.	83.	110.	7.8038	15.6076
12 B. & S G.	80.81	105.	8.1946	16.3892
14 N. B. S. G.	80.	102.	8.4005	16.8010

Table 1.

The table also shows the weight and resistance per mile of wire of each size, and also enables one to see at a glance the resistance of a mile of metallic circuit or "loop," as the term is colloquially used.

The same facts as are covered by the first three columns of Table 1 are converted into graphic form in Figure 1. This curve shows the relation between diameter in thousandths of an inch, or miles, and weight in pounds per mile of single wire. Though gauge numbers are confusing because there are the same numbers with different sizes in the various gauges, the two fixed facts about any copper wire are its diameter and its weight. By far the better way, in thinking of and dealing with wires, is to treat them either as to diameter or as to weight, forming a habit in this regard. If the habit be formed as to weight, one will think of 166-pound wire just as easily as of No. 10 B. & S.

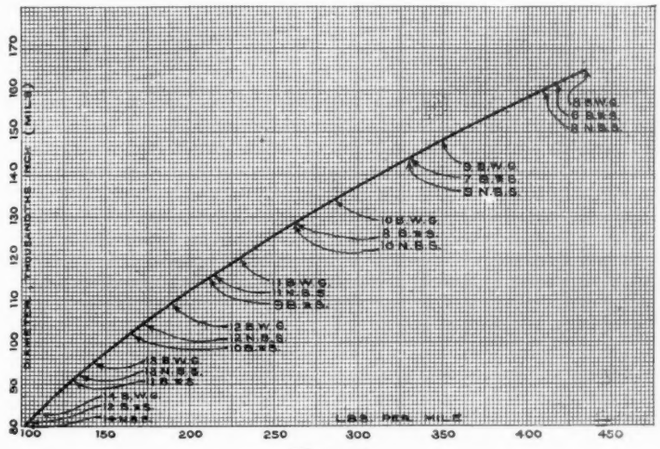


Figure 1.

gauge, and if the habit be formed as to diameter, one will think of 104 wire (meaning .104 of an inch in diameter) just as readily as No. 12 New British Standard gauge. There is an enormous advantage in this practice, as, while one may say No. 12 wire, and mean either of three different gauges, widely differing in size, he cannot speak or think of pounds per mile of single wire or of diameter in thousandths of an inch, and mean anything but the exact fact in question.

If one fixes upon diameter as his mental basis for considering copper wires, the weight in pounds per mile may be determined by remembering a single fact about all wires, and thus he will be able to determine the weight for any size with which he may be treating.

The fact in question is based upon the other facts that all wires for telephone lines are round ones, and all copper line wires are alike in material. There must be, therefore, a constant relation between the diameter and the weight. This relation is that the square of the diameter, in thousandths of an inch, divided by 62.5, gives at once the weight in pounds per mile of single wire.

If one is familiar with the use of the slide rule, it is a simple matter to square the known diameter and divide by 62.5. If not, the problem is not burdensome and is simpler than to refer to a table, particularly if one has to stop and hunt it up. If the worker is facile in mental arithmetic the square of the diameter may be multiplied by 16, and the last three figures dropped, giving the weight per mile at once. This is the same as the foregoing, but amounts to multiplying by 16 first and dividing by 1,000 afterward. As a fraction of a pound is of no account, dropping the last three figures is simply to divide by 1,000 and disregard the fraction.

If the squaring of the diameter and multiplying by 16 is considered a hardship, two steps may be taken instead of one, by multiplying the square of the diameter to the weight per mile which is the basis of the curve in Figure 1, and

while the curve is true for all points in its range, those which correspond to the various gauge sizes shown in Table 1 have been picked out and named. It is interesting to note how the various gauge sizes group themselves in these, and that several of them, as the curve clearly shows, are almost identical with each other.

As the square of the diameter in thousandths of an inch is only another way of speaking of the area in circular miles, if one is familiar with the area so expressed, it may be divided at once by 62.5 to give the pounds per mile. In that part of telephone calculations having to do with power plants, the area in circular miles is the characteristic by which one thinks of wires, and their weight may be known with the greatest ease in this way, as the slight operation of squaring the diameter is not necessary.

Once a line is erected, the two principal needs of knowing its resistance are to determine from time to time whether the line has developed to a high resistance fault, and to determine, when necessary, the location of a ground or cross upon it. In these cases it is to be cautioned that the resistance of the wire should not be taken from a table, but should be determined, in the first instance, from records of

of a given size may be wound on it, but it is more difficult to know these facts concerning copper wire which has been covered with cotton or silk. Yet something may be done, and tables have been prepared for standard wire sizes with definite thicknesses of silk and cotton insulation. As a result of facts collected by Mr. Arthur Vaughan Abbott and Mr. Franz J. Dommerque, the turns per linear and per square inch of B. & S. gauge wires from No. 20 to No. 40 have been tabulated. This information, supplemented by a tabulation of the number of ohms per cubic inch of winding space for wires of three different kinds of insulation, makes up Table 2 presented herewith. I have taken the liberty of calculating and appending this information as to ohms per cubic inch, and have found it of some value in my own work.

Bearing in mind that the calculations of table 2 are all based upon the "diameter over insulation," which it states at the outset for each of four different kinds of covering, it is evident what is meant by "turns per linear inch." The columns referring to "turns per square inch" mean the number of turns of which the ends would be exposed in one square inch if the wound coil were cut in a plane pass-

Winding Data for Insulated Copper Wires' Silk and Cotton Covering.

Number B & S	Diameter mills	Area circular mills	Diameter Over Insulation				Turns per Linear Inch				Turns Per Square Inch				Ohms Per Cubic Inch			Number B & S
			single cotton	double cotton	single silk	double silk	single cotton	double cotton	single silk	double silk	single cotton	double cotton	single silk	double silk	single cotton	double cotton	single silk	
20	31.961	1021.20	37.861	42.161	34.261	36.161	25.7	22.5	27.70	26.22	660.5	506.3	767.3	687.5	.646	.533	.801	20
21	28.462	810.10	34.362	38.662	30.762	32.662	28.3	24.5	30.97	29.07	800.9	600.2	959.1	845.0	.981	.795	1.261	21
22	25 347	642.70	31.247	35.547	27.647	29.547	31.0	26.7	34.39	32.11	961.0	712.9	1182.7	1031.0	1.502	1.188	1.956	22
23	22.571	509.45	28.471	32.771	24 871	26.771	34.4	28.97	38.19	35.53	1183.0	839.2	1458.5	1262.4	2.359	1.772	3.049	23
24	20.100	404.01	26.000	30.300	22.401	24.300	36.9	31.35	42.37	39.14	1321 6	982.8	1795.2	1532 0	3.528	2.595	4.739	24
25	17.900	320.40	23.800	28.100	20.200	22.100	38.0	33.92	47.02	42.94	1444.0	1150.8	2210.9	1843.8	5.831	3.802	7.489	25
26	15.940	254.01	21.840	26.140	18.240	20.140	42.0	36.29	52.06	46.81	1764 0	1317.0	2710.3	2191.2	6 941	5.552	9.031	26
27	14.195	201.50	20.095	24.395	16 495	18.395	48.0	38.95	57.67	51.59	2304.0	1517.2	3326.0	2661.6	10.814	8.078	13.92	27
28	12.641	159.79	18.541	22.841	14.941	16.841	53.0	41.61	63.36	56.43	2809.0	1731.0	4014.5	3184.5	17.617	11.54	26.86	28
29	11.257	126.72	17.157	21.457	13.557	15.457	56.5	44.27	70.11	61.56	3192.3	1959.9	4915.5	3789.8	25.500	16.47	41.29	29
30	10.025	100.50	15.925	20.225	12.325	14.225	59.66	46.93	77.14	66.79	3559.2	2202.5	5950.2	4461.0	34.800	23.43	62.98	30
31	8.928	79 71	14.828	19.128	11.228	13.128	64.125	49.78	84.64	72.39	4112.2	2478.0	7164.0	5240.0	48.5	32.83	95.70	31
32	7 950	63.20	13.850	18.150	10.250	12.150	68.600	52.34	92.72	78.19	4692.5	2739.5	8597.5	6114.0	73.8	46.19	144.70	32
33	7.080	50.13	12.980	17.280	9.380	11.280	73.050	55.10	101.65	84.17	5333.5	3036.1	10332.0	7085.0	104.5	64.30	217.8	33
34	6.304	39.74	12.204	16.504	8.504	10.504	77.900	57.57	112.11	90.44	6068.5	3314.2	12570.0	8179.5	151.4	70.58	342.1	34
35	5.614	31.52	11.514	15.814	7.914	9.814	82.600	60.04	119.7	96.90	6773.3	3605.0	14328.0	9389.5	202.0	125.9	489.0	35
36	5.000	25.00	10.900	15.200	7.300	9.200	87.100	62.51	130.15	103.55	7586.5	3907.5	16940.0	10722.0	298.8	166.3	721.1	36
37	4.453	19.83	10.353	14.653	6.753	8.653	91.870	64.70	140.6	110.20	8440.0	4186.1	19770.0	12145.0	418.0	225.6	1062.0	37
38	3.965	15.72	9.865	14.165	6.265	8.165	95.000	66.80	151.05	116.85	9025.0	4462.2	22820.0	13655.0	567.0	305.5	1557.0	38
39	3.531	12.47	9.431	13.731	5.831	7.731	100.700	68.80	163.04	122.55	10140.5	4733.6	26700.0	15018.0	811.0	409.8	2266.0	39
40	3.144	9.89	9.044	13.344	5.344	7.344	106.000	71.20	177.65	129.20	11236.0	5069.8	31559.0	16692.0	1113.0	545.5	3400.0	40

Table 2.

previous tests, and in the second instance from an actual measurement, as a part of the fault-locating operation.

The considerable variety of wire gauges is of no annoyance, in this country, to those dealing with wires used in windings. The American or Brown & Sharpe gauge is uniformly utilized in wires which are to be wound for magnets. Except for special uses, occuring in the larger machines, insulated wires for windings are round.

The two things principaly affecting the manufacture of electro-magnets for telephone purposes are the number of turns in a winding and the resistance of the wound wire. The latter governs the amount of current which may flow through the coil with a given difference of potential at its ends, while the former controls the amount of magnetism produced in the core by the current owing. While a cord is being wound, it is a simple matter to count the turns by any simple form of revolution counter. When the coil has been completed it is a simple matter to measure its resistance. But it is not so simple to determine in advance how many turns of a given size wire may be placed on a given spool, and still less simple to know what the resistance of the wire on that spool will be when the desired turns shall have been wound.

Presuming the length and depth of the winding space of the spool to be known, as well as the diameter of the core, it is not difficult to determine how much bare copper wire

ing through the axis of the core. Knowing the distance between the heads, and the depth to which the coil is to be wound, it is easy to select a size of wire which will give the required number of turns in the provided space. It is to be noted that the depth of winding space is one-half of the difference between the core diameter and the complete diameter of the wound coil.

The resistance of the entire volume of wound wire may be determined in advance by knowing the total cubic contents of the winding space and multiplying this by the ohms per cubic inch of the selected wire; that is, one must multiply in inches the distance between the heads of the spool by the difference between the squares of the diameters of the core and the entire winding space, and this in turn by .7854. This content, times the ohms per cubic inch, as given in the table, results in the resistance of the winding.

There is a considerable variation in the method of applying silk insulation to the finer wires, and it is in the finer sizes that the efforts, if any, pile up most rapidly. Yet the table throughout is based on data taken from many samples of actual winding by the present processes of winding small coils. It has further been compared with many examples and has been used in calculating windings in advance and is found to be as close an approximation as is afforded by any of the formulae on the subject, with the further advantage that it is not cumbersome to apply.

In experimental work involving the windings of coils, it is frequently necessary to try one winding to determine its effect in a given circuit arrangement, and from the knowledge so gained to substitute another just fitted to the conditions. It is in such a substitution that the table is of the most value. Assume a case in which a spool and core of a given size would require to be used, and with a winding of No. 25 wire, single silk covered, of a resistance of 50 ohms. Assume that the circuit regulations require that this spool shall be rewound to have a resistance of 1,000 ohms. What size single silk covered wire shall be used?

Manifestly, the winding space remains the same, or nearly so. The resistance is to be increased to twenty times its first value. Therefore, the wire to be used must show in the table twenty times as many ohms per cubic inch as are shown No. 25, the known first size. This amount would be 20 times 7.48, which is 149.6, but there is no size giving that exact resistance. No. 32 wire, however, is very nearly of that resistance, and if wound to exactly the same depth would give about 970 ohms. A few turns more would provide the additional 30 ohms.

Similarly, in a coil known to possess a certain number of turns, the table will give the size to be selected for rewinding to a greater or small number. In this case, as in the case of substituting a winding of different resistance, it is unnecessary to measure and calculate upon the dimensions of the spool and core. Assume a spool wound with No. 30 double silk covered wire, which requires to be rewound with a size to double the number of turns. The exact size to do this would have 7,579.6 turns per square inch and would be between Nos. 33 and 34. A choice of these two wires may be made, using an increased winding depth with the smaller wire and a shallower one with the larger.

SCRIPTURAL TELEPHONE REFERENCES.

The New York Sun has compiled the following Scriptural quotations referring to the telephone:

THE COMPANY.

Their line is gone out to all the earth and their words to the end of the world. Ps., xix, 4.

TRUNK WIRES.

Thy land shall be divided by line. Amos, vii, 17.

THE SERVICE.

Prepared for an hour, and a day, and a month and a year. Rev., ix, 15.

They are employed in the work day and night. I Chron., ix, 33.

MONOPOLY.

We have no might against this great company. II Chron., xx, 12.

Now shall this company lick up all that is around about us? Num., xxii, 4.

THREATENED COMPETITION.

See! There come people down by the middle of the land, another company come along! Judges, ix, 37.

THE NEW ZONES.

The great city was divided into three parts. Rev. xvi, 19.

Charge the people! Exod., xix, 21.

A daily rate for every day. II Kings, xxv, 30.

And kept back part of the price. Acts, v, 2.

"INFORMATION."

Is there any number? Job, xxv, 3.

I know not the number thereof. Ps., lxxi, 15.

Search may be made in the book of the records. Ezra, iv, 15.

He telleth the number. Ps., cxivii, 4.

His number is 666. Rev., xiii, 18.

I understood the number. Dan., ix, 2.

THE CALL.

When I call, answer me speedily. Ps., cii, 2.

Then they awaited according to their order. I Chron., vi, 32.

Call now, if there be any that will answer thee! Job, v, 1.

Where is the receiver? Isa., xxxiv, 18.

Let every man be swift to hear and slow to speak. James i, 19.

Thou didst call me. I Sam., iii, 6.

THE CONVERSATION.

Call thou and I will answer, or let me speak, and answer thou me. Job xiii, 22.

They could not take hold of his words. Luke xx, 26.

Ye have heard my conversation in time past. Gal., i, 13.

Except ye utter words easy to be understood, how shall it be known what is spoken? For ye shall speak into the air. I Cor., xiv, 9.

We use great plainness of speech. II Cor., iii, 12.

Except they give a distinction in the sounds, how shall it be known? I Cor., xiv, 7.

I had rather speak five words with my understanding than ten thousand in an unknown tongue. I Cor., xiv, 19.

THE INTERRUPTION.

I said in my haste, "I am cut off." Ps., xxxi, 22.

There is no speech nor language. Ps., xix, 3.

His name should not have been cut off. Isa., xiviii, 19.

If he cut off, and shut up, who can hinder him? Job, xi, 10.

There are so many kinds of voices in the world. I Cor., xiv, 10.

Thou hearest the sound thereof, but canst not tell whence it cometh. John, iii, 8.

Put off the former conversation. Eph., iv, 22.

I will cut him off. Lev., xvii, 10.

A dreadful sound is in his ears. Job, xv, 21.

The sound of the grinding is low. Eccles., xii, 4.

Who hath stretched the line upon it? Job, xxxviii, 5.

Cut off its branches. Dan., iv, 14.

Rebuke the company! Ps., ixviii, 30.

What a word is this! Luke, iv, 36.

Evildoers shall be cut off. Ps., xxxvii, 9.

They went to their own company and reported. Acts iv, 23.

THE PARTY WIRE.

Line upon line, line upon line. Isa., xxviii, 10.

Both parties shall come before. Exod., xxii, 9.

While they are yet speaking I will hear. Isa., ixv, 24.

Not to boast in another man's line. II Cor., x, 16.

PAY STATIONS.

Will they not pay toll? Ezra, iv, 10.

It shall not be lawful to impose toll. Ezra, vii, 24.

Thou hast nothing to pay. Prov., xxii, 27.

HARVESTING BY TELEPHONE.

J. A. Frambers of Oxford, Mo., has put the telephone to a new and novel use, says the Kansas City Journal. Sumner county is covered with a network of rural telephones. All told, there are more than 3,000 telephones in the county. Mr. Frambers kept his thrashing outfit in constant communication with these telephones. He is a member of the Oxford Mutual Company and has had a telephone installed in his cook shack. Whenever Mr. Frambers moves his thrashing outfit on to a farmer's premises his cook shack telephone is immediately connected with the telephone wire running along the highway, and no matter how far out in the country he may be Mr. Frambers and his cook are in constant communication with the grocers, butchers and other supply houses. Mr. Frambers can also call up almost any farmer in the county to talk thrashing to him, and the "next" man on Mr. Frambers' list can, simply by using the telephone in his home, learn just when the thrashermen will arrive at his place.

TELEPHONE CONSTRUCTION PRACTICE

An Article Dealing With Guys and Messengers

By H. J. Minhinnick

IN THE discussion of guys and messengers we encounter what is, perhaps, the most difficult portion of the entire installation of a telephone system, and the author wishes to apologize in advance for the many sins of omission he will surely commit. The subject might well be expanded into a volume instead of being compressed within the limits

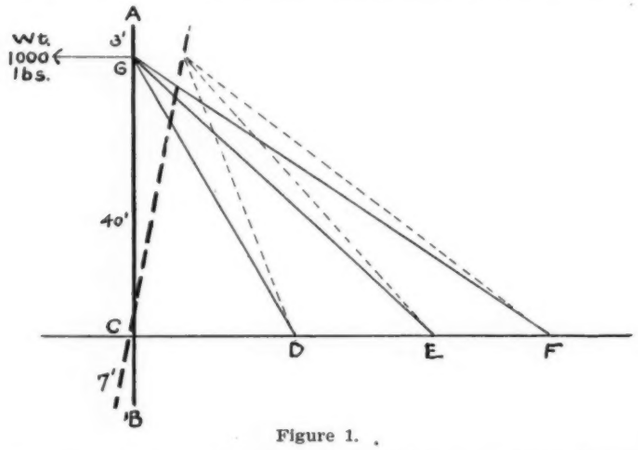


Figure 1.

of a magazine installment and it will be possible to discuss only general principles and give a few illustrations of their application.

It may be laid down as the one broad rule that every strain must be guyed against as nearly as possible at the point of its application; that the guy must be of sufficient strength, and that it must be set so as to adequately take up the strain to which it is opposed. A simple diagram will illustrate the theory of the subject. Let the line *AB*, Figure 1, represent a 50′ pole set 7′ in the ground, with a strain of 1,000 lbs. applied at the point *G*, 3′ from *A*, in the direction indicated by the arrow. If we assume the pole to be

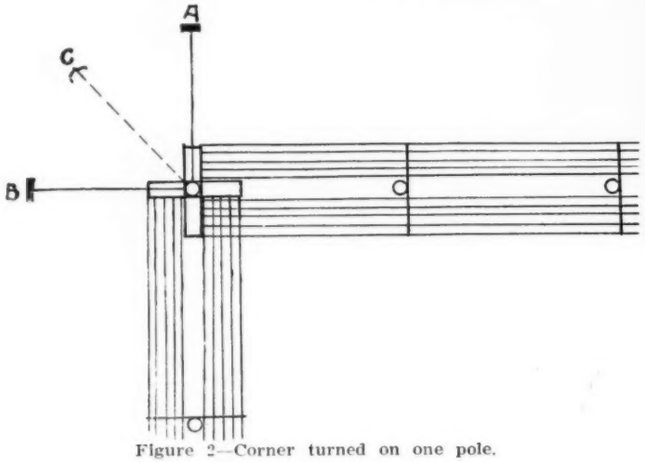


Figure 2—Corner turned on one pole.

perfectly rigid, it is plainly apparent that there would exist at the point *C* the enormous strain of $40 \times 1{,}000 = 40{,}000$ lbs., which would, of course, destroy the pole. As however neither the pole nor the supporting earth is rigid the practical result would be that the pole would be both bent and tipped over to the left till the strain was reduced to practically zero. A study of this diagram will lead to several important results—(1) The proper point at which to attach the guy is *G*, or as near it as possible, for, if attached below this point, the strain on the anchor will be increased, and, if attached above it, the bending strain on the pole would be largely added to. (2) The further back from the pole the anchor can be placed the better, for the strain is divided by the guy into two resultants, one downward and one against the anchor and, as we wish to remove all possible strain from *AB*, it is evident that the anchor, if placed at *E* is in a better position than if at *D* and would be in a still better location if at *F* or beyond it. (3) If the pole itself be raked to the right as shown by the dotted lines,

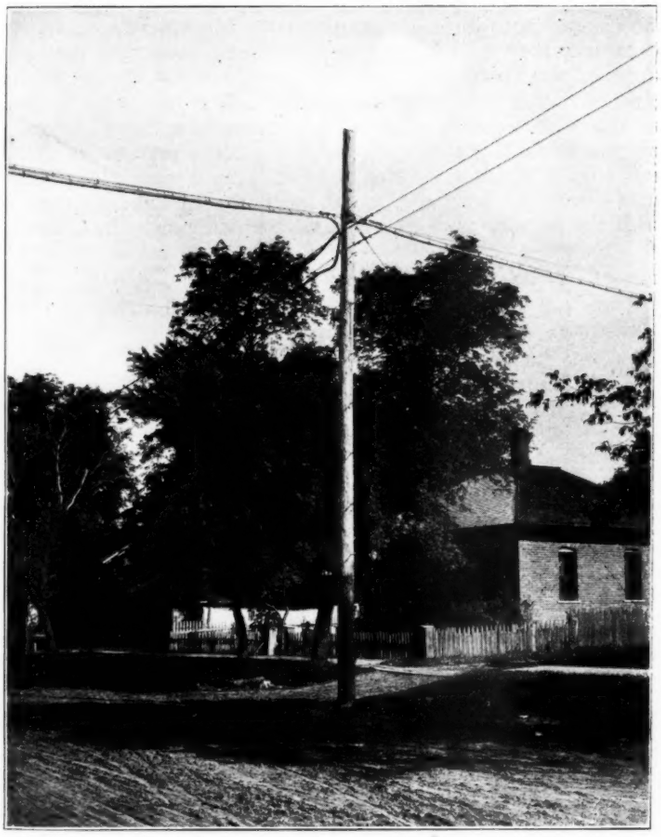


Figure 3.

the resultant between the strain and the guy will be brought more nearly in line with the center of the pole and will therefore have less tendency to bend or buckle it. We have therefore arrived at some important theoretical conclusions and it remains to apply this theory in practice.

It has been said that every strain must be guyed against and this means just what it says; in other words, if there are two or more separate strains on a pole two or more guys are required. The commonest case of this sort is when a corner is turned where, as shown in Figure 2, there are two strains on the pole, one at right angles to the other. Here the proper practice is to set two guys as shown at the points *A* and *B*, although, theoretically, the strain would be equally

well held by a guy running to the point *C*, as shown by the dotted line, this latter being known to linemen as a "quarter-guy." Were the two strains absolutely equal this last method would be correct but it is impossible to determine the relative values of the strains—in fact they are constantly changing—and, to avoid all chance of error, each strain is cared for separately. On the other hand, when the angle between the strains becomes greater than a right angle, a point will be reached where this form of guy is entirely appropriate. The photograph, Figure 3, shows a heavy cable lead thus supported, the included angle at the pole being in this case 155". Ordinarily speaking, however, the rule holds good and a guy should be set opposite each individual strain.

Guys are of two general descriptions. In one a wire,

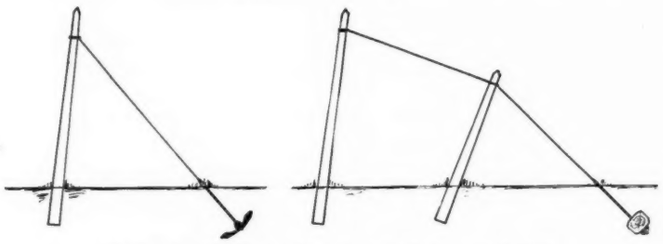


Figure 4—Showing plain guy and guy and stub.

strand or iron rod is run from the pole to some form of anchor buried in the ground; in the other a stout stub is interposed between the anchor and the pole, the latter form being used when it is necessary to elevate the guy over an obstruction such as a street. Both forms are shown in Figure 4. It is evident that, in either case, the ultimate strain must come upon the anchor, which must be made sufficiently strong to adequately support its load. The commonest anchor is a heavy timber from 4′ to 7′ long, with a hole bored through its center, carrying a wrought iron rod fitted at the bottom with a nut and heavy washer and at the top with an eye to which the guy is attached. Another form of rod substitutes a small eye, through which an iron rod can be passed for the nut and washer—both patterns are illustrated in Figure 5. The washer should never be less than 4" × 4" × ¼" and. after the nut is screwed on, the end of the bolt below it should be upset by a few blows from hand axe or hammer so that the rod cannot possibly be un-

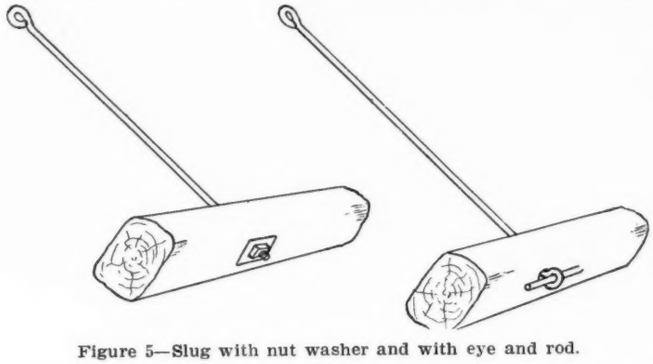


Figure 5—Slug with nut washer and with eye and rod.

screwed. The author prefers the nut and washer to the double eye as, by its use, one weld is avoided and the slug is not weakened by so large a hole. The length of the rod depends on the depth at which the anchor is to be set and the angle it makes with the surface of the ground. If the anchor be set 6′ deep (and it should never be less) at an angle of 45° it is evident that, to reach the surface, the length of the rod must be 8.5′—in other words a 9′ rod is about as short as can be used. It is good practice to order ⅝" rods 9′, 1" rods 10′ and 1¼" rods 12′ long. The size and length of the slug depend on the strain, and it is a safe rule that a slug carrying a ⅝" rod should be at least 6" in diameter and 5′ long, one carrying a 1" rod 8" in diameter and 6′ long and one carrying larger rods 12" in diameter and 7′ long. This rule reduces the question of the strength of the anchor to terms of the size of rod and throughout the balance of the chapter it will be understoodd that in speaking of a 1" or other anchor, one fitted as described is meant.

The hole for the slug should be dug as far back from the pole as is convenient and at right angles to the direction of strain. It is a safe rule to set the slug at least as far back as the height of the guy above the ground thus making the latter form an angle of 45° with the line of strain and, except where utterly impossible, this rule should not be varied. The hole must be dug of ample size and, as shown in Figure 6, should be battered in on the side next the pole so that the slug may bear against undisturbed earth; the same illustration shows an incorrect but too common method of setting. The rod must run directly in line with the guy to effect which a narrow trench is dug at right angles to the slug hole slanting from the surface at the proper angle which is usually determined at the time the slug is set by sighting along the rod to the pole. The slug being placed in position and the rod set at the proper angle all that remains is to tamp the earth back solidly. In extremely light or marshy soils it may be found necessary to drift some timbers across the slug at right angles to it so as to afford further bearing surface or a platform may be framed and placed above the slug for the same purpose. In such cases, however, the undoubtedly better practice is to set the anchor

Figure 6—Showing correct and incorrect method of slug setting.

in concrete, which will be found at least as cheap as the extra excavation and timbers. Very heavy anchors should always be concreted if there is the slightest doubt as to the holding quality of the soil and it would hardly seem necessary to add that the heavier the strain the deeper the slug must go. In holding a lead carrying two or three cables as, for instance, where the underground and aerial systems join, it is common practice to use a 1¼" rod, 15′ long, and to bury the slug 10′ deep, covering it with 5′ of concrete.

As a substitute for the slug and rod there are on the market many forms of iron anchor for which the manufacturers claim economy, ease of setting and at least equal holding power. These may be divided into three classes—those screwed into position, those that are driven and those that are set into a small hole and are furnished with wings that open when the strain is applied. All of these are admirable and will answer every purpose for which they are designed. The small sizes are very economical and remarkably efficient. The rod may be plain or galvanized as preferred, it being an undoubted fact that a plain rod will last at least twice as long as the pole; the galvanized rod presents a somewhat neater appearance and costs but little more. Care must be taken in ordering rods to insist on a large eye as two or three ½" strands may require accommodation on the same rod; when the rods are received into stock every weld should be carefully examined, for nothing is quite so aggravating as to get an anchor completely set and have the eye break open when the strain is applied.

The ideal anchor is one set in solid rock, but it is rare that an opportunity for this presents itself. The drawing, Figure 7, shows the detail of such an anchor, which consists of a 4′ × 1¼" rod split at the bottom to receive the point of a wedge 3" long, 1¼" wide and ⅝" thick. The hole is drilled 3′ 9" deep with a 1¼" drill, which will give a

diameter of 1½" for the finished hole; the wedge is inserted into the slot at the end of the rod which is placed in the hole and driven home with a sledge, the result being that the split ends are expanded so firmly against the sides of the hole that nothing short of a strain which would break the rod can move it. A cement composed of equal parts of sulphur and stonedust melted together is then poured around the rod till the hole is completely filled up; this mixture forms, when cold, a compound as hard as granite.

The size of anchor must be determined for each particular case. For light corners on leads carrying no cable ⅝", for ordinary line and messenger guys 1", and for heavy cable terminal guys 1¼". As a ⅝" rod has a breaking strain of approximately 16,000 pounds, it is apparent that this rule gives a large safety factor and can be safely followed. As was stated before, for extremely light strains nothing is more economical or efficient than a small iron anchor of any of the standard patterns. Each anchor should be noted in the field book at the time of the original survey, and when the maps showing subscribers, cables, etc., are completed it becomes an easy matter to determine just what size of anchor is necessary at each point. The foreman of

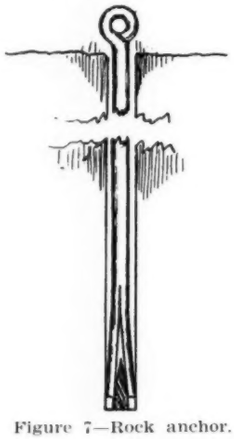


Figure 7—Rock anchor.

the slug setting crew will receive each day an order in the following form:

SLUG ORDER.

Pole.	Direction.	Distance.	Size.	Position.
105	N.	37′	⅝	Under 1st arm
116	N.	28′	1¼	Under 5th arm
116	S.	38′	1″	Under 2d arm
127	N.	41′	1″	Under 5th arm
127	W.	36′	1″	Under 5th arm

Such an order removes all responsibility from the foreman and places it where it belongs—on the office force. The last column refers to the position of the guy on the pole and determines the angle at which the rod is to be set.

The anchor being duly set, there remains for consideration the kind and size of the guy and the proper amount of rake to be given the pole. It is, of course, impossible to lay down any hard and fast rule which will be of universal application but one will not be very far astray if the following practice be adopted: For extremely light strains, such as the outer end of a lead, a No. 6 double galvanized steel wire; for ordinary line guys, two ⅜" strands, one below the top arm, the other below the third; for guys ahead of ⅜" messengers, a double 7-16" strand; and for all heavier strains one or more double ½" strands. The methods of attaching and some forms of special guys will be discussed in the following paragraphs and, in the meantime, there remains for consideration the amount of rake to be given the pole. The common error lies in not inclining the pole enough—in fact, it is very rarely that the opposite mistake is seen. No matter how carefully both pole and anchor be set, they will both give a little when the strain is applied, and nothing looks worse and really *is* worse than a pole leaning away from its guy; it is far better to err in the opposite direction and incline the pole too much. The foremen should be instructed to rake the pole as far as they think necessary and then give it an extra foot; if the top of a 50′ pole be inclined 3′ towards the anchor it will be none too much. There is but one exception to this rule, and that is where a pole is guyed ahead against the messenger and back against the line wires; in this case the guys must be so adjusted that the pole will be as nearly as possible perpendicular when the several strains are applied.

The only tools required for setting guys are a pair of

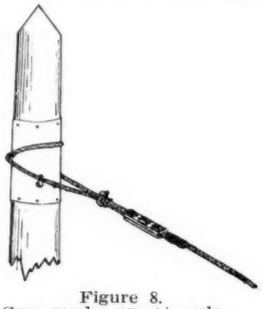


Figure 8.
Guy made up at pole—galvanized protection strip.

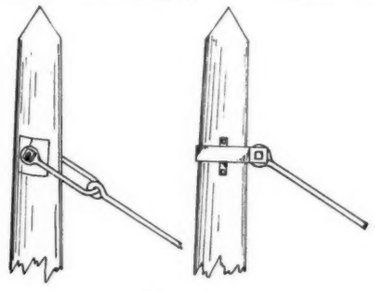


Figure 9.
Bell pattern iron rod guy and same with collar.

triple 6" wooden blocks fitted with a ⅞" line long enough to allow a spread of 10′, a pair of the large size Haven clamps and the necessary wrenches for the clips. The first step is to run a light temporary guy (usually a No. 6 wire) to the pole ahead, so that the pole, being guyed, will not be pulled over too far when taking up the slack; the next is to place some form of protection around the pole at the point where the guy is to be made up. This protection may be either guying shims, which are 1"x¼"x8" iron strips, galvanized, and spaced 3" in the clear all around the pole, or a sheet of No. 16 galvanized iron 7" wide, long enough to reach around the pole and fastened in place by 8d. nails. The latter is not quite so cheap in first cost, but is much more readily applied and makes a neater job. A single guy is made up at the pole, being passed twice around and the end secured with a Crosby clip and a 3-bolt clamp; the clip

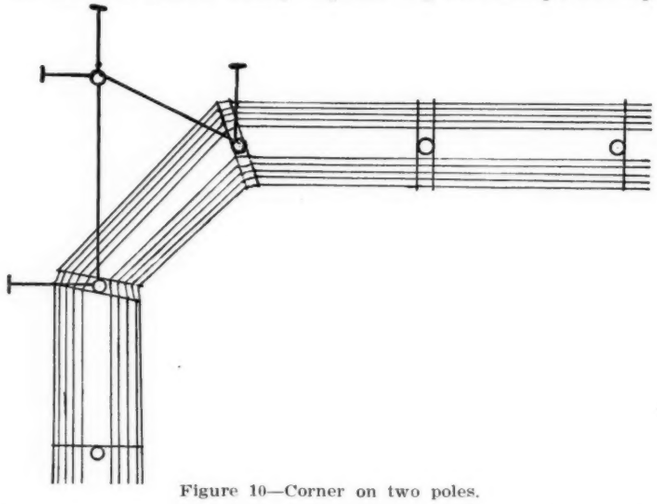


Figure 10—Corner on two poles.

is put on first and before being completely tightened is driven as close to the pole as possible (to effect this it will be necessary to take a light strain on the guy), both clip and clamp are then tightened up, the projecting end of the strand cut off within an inch or two of the clamp, with the exception of one wire, which is wrapped around the guy proper, and the operation is complete. Owing to the impossibilty of obtaining a good photograph of the upper end of a guy the drawing herewith (Figure 8) is submitted as showing the correct method. After the guy is made up as described, two pole steps are driven under the throat of the

loop, as shown in the same cut, to prevent any possibility of its slipping down the pole. The guy strand is then cut to the proper length, the lower end passed through the eye of the anchor, and doubled back; the Haven clamps with the blocks attached are fastened, one to the guy, the other to the free end, and a sufficient strain taken to (1) draw the guy tight and (2) give the pole the desired rake. If the strand shows a disposition not to slip around the eye when under strain, it may be helped by lightly hammering the loose side. When fully tightened the lower end is made up in

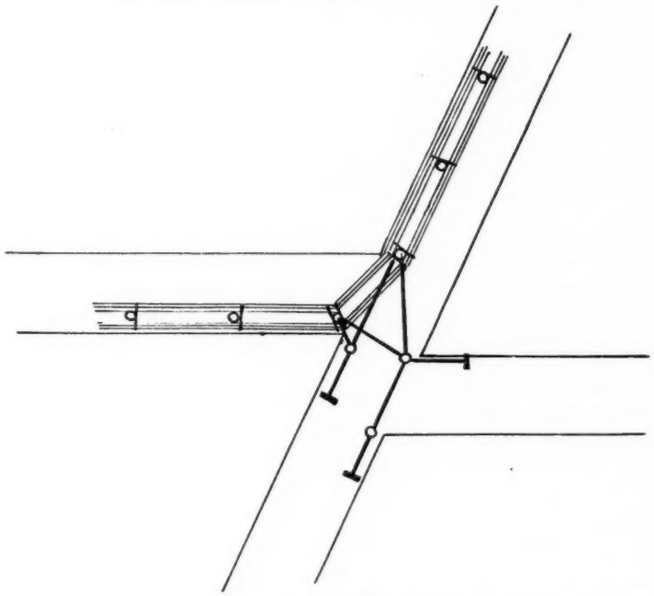


Figure 11—A complicated guy.

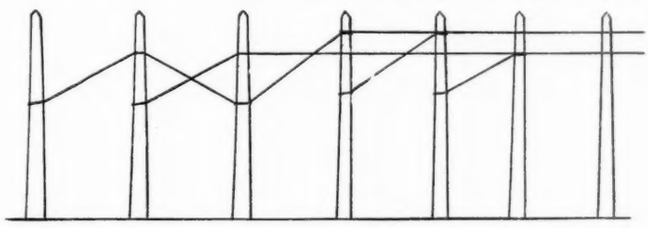
precisely the same way as the upper. The temporary guy is then removed and the process is complete. If more than one guy be necessary, great nicety of judgment is required to make sure that the strain is evenly divided between the two strands; this is something that must be learned by actual experience, as it is hardly possible to give any directions that might be of service unless it be to say that after the first strand has been drawn to the proper tension and made up, the second should be pulled so as to throw just a trifle of slack into the first. A double guy is made up in the same way as a single save that the strand has no free end at the pole, both ends coming down to the anchor, where they are made up separately; of course, the Crosby and three-bolt are used at the pole just as in the case of a single strand. If a stub be necessary between the pole and the anchor, it is guyed first and given a very heavy rake, 30 degrees being none too much; the guy proper is then set between pole and stub precisely as before described, save that after the pole end is made up the blocks are fastened to a sling around the upper end of the stub, and when the slack is taken up the free end of the strand is passed twice around the stub the same as at the pole and completed in the same way.

Before underground construction became common it was frequently necessary to take care of strains which required stouter guys than ordinary strand and, while these cases are now met with but rarely, a chapter on guying would hardly be complete without mention of the methods employed. Figure 10 shows a favorite Bell pattern and requires no explanation. A better form, shown in the same figure, substitutes a collar around the pole for the side pieces, with bolt and fork, this collar being supported by four small brackets, two bearing upwards and two downwards, the entire arrangement of collar brackets, etc., being the same as on a self-supporting guy stub. It would hardly seem necessary to add that when work of this sort is required, pole, stub, and anchor must all be set in concrete.

It would be utterly impossible to illustrate all the ways in which guys must be set, but if the rule already given—one guy for each separate strain—be adhered to, no mistake can be made. Fig. 10 shows a not uncommon case where a corner is turned on two poles instead of on one; it will be noticed that the stub is guyed in two directions instead of in one. Fig. 11 illustrates about as complicated a case as has ever come within the writer's experience; here, owing to the peculiar arrangement of streets and alleys it was found necessary to set a second stub and anchor to support the first. It will be observed that, in both these cases, the rule already given has been strictly complied with, although as shown it is sometimes necessary to pick up the strain by two guys at varying angles instead of by one in the straight line.

There is one not infrequent case where it is impossible to set a guy at all, or even a self-supporting pole; this is where a branch lead runs up an alley which is not open on the other side of the street. The only remedy in such a case is to guy the first pole of the branch line, setting it as close to the main line pole as possible and to string the intervening span with insulated wire, which is allowed to hang slack so as to avoid side strain on the main lead. The pole in the primary lead should be set a foot or more out of line (towards the curb) so it can be given a considerable rake and still have its top in line, and it is also well to set it in concrete. This is a makeshift process at best and should be avoided wherever possible. Another rare case is where it is not possible to set a guy ahead of a messenger. It is entirely practicable to so truss the lead that the strain can be safely taken up, and the drawing (Figure 12) shows such a scheme for one and two cables. It is hardly likely that this complication will be often met, and it would be better and cheaper to continue the messenger till a point at which an anchor can be set is reached.

When it becomes necessary to run guys through electric



A

Two cables—"A" indicates cable pole.

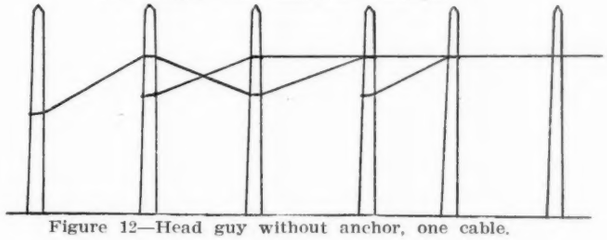


Figure 12—Head guy without anchor, one cable.

light or other high tension circuits, it is most excellent practice to place two strain insulators in the strand, one above and one below the light wires, so that no accident can cause either guy or messenger to become "hot." More linemen have been killed through guy crosses than in any other way. As a substitute for the insulator, a piece of heavy rubber hose may be tied around the guy where it passes between the high tension wires, but this is not good practice, as the cost of the strain insulator is low and its use makes a permanently safe job, while the hose is bound to give out in time. In this connection it may be well to say that men must be taught not to handle a line wire or even a drop while they (the men) are grounded on a messenger, guy or cable.

DECISIONS AFFECTING TELEPHONY

By Gilbert W. Hand

WHO ARE THE FELLOW SERVANTS AS DISTINGUISHED FROM VICE PRINCIPALS.

AN interesting case from the Missouri supreme court, in which the Bell Telephone Company of St. Louis was defendant, contains a discussion of the questions involved in the above heading. One Hollweg was a wood worker in the employ of defendant at its St. Louis shops and was engaged with one or two others at some wood work about the shops. The foreman, Loughman, had instructed the employes to do some cutting with a circular saw which the foreman, along with the employes, had been in the habit of using as necessity required. When Holiweg went to use the saw it was out of gear. When it was thrown in gear a piece of wood flew and hit him in the eye and blinded him partially. There was some evidence that the foreman had been the last one to use the machine. The negligence relied on was that of the foreman as vice principal in so leaving the piece of wood in a place where injury could result from its being drawn toward the revolving saw. The company contended that the foreman in this instance was a fellow servant and that under the rule of law that the master is not liable to one servant for the acts of a fellow servant, it was not liable for the injury. The Court said: "It is a rule of universal application that it is the duty of the master to furnish his employe a reasonably safe place to work, and not to expose him to unknown dangers not incident to the employment, and the master cannot relieve himself of such responsibility by delegating his duty to some other person. * * * In the case at bar, however, the plaintiff's right to recovery is not bottomed on this theory, but upon the ground that the foreman was guilty of negligence in failing to perform the duty which he, as vice principal, owed to plaintiff as an employe; and if the plaintiff was injured by reason of the foreman's failure to discharge that duty, the master is liable for damages for the injury sustained, even though the foreman occasionally worked the machinery and acted in the capacity of a co-laborer or fellow servant. 'A vice principal,' then, as the term is used in the law of fellow servants, is a servant who represents the master in the discharge of those personal or absolute duties which every master owes his servant. * * * As a general rule, 'fellow servants' may be said to be those engaged in a common employment in the service of the same master.'" And quoting from another Missouri case, it was said that whenever the injury results from the act or order of the vice principal, whether acting by himself, or through another, while exercising his power and discharging his duty as a vice principal, the master has been held liable." The rule here announced can only mean that the foreman may act as a co-laborer at the same time, and that even if he is acting as a co-laborer at the time of the injury, nevertheless, if the injury was caused by his act in his capacity as foreman, and not in his capacity as laborer, the master is liable.

—*Hollweg v. Bell Telephone Company*, 93 *S. W.* 262.

CARE REQUIRED IN HANDLING ELECTRICITY.

The following statement includes the important facts in a recent case decided by the Oregon supreme court, in which an electric company was charged with negligence which caused the death of one Carroll. The defendant, the Grand Ronde Electric Company, operates a power plant at Cove, in the above state, from which it furnishes electricity for various purposes to adjacent town and rural customers. On one of the branch lines a wind storm had broken down two heavily charged wires, and a farmer, fearing that fire would be started by them, fixed up a dry stick and hook by which he managed to loop them around one of the palings of a picket fence. In his curiosity to learn whether it was charged with electricity he placed his hand about eight inches from the wires and immediately received a violent shock. That evening at supper the matter was talked over, at which conversation Carroll, a hired hand, was present and took part and heard the warning which the farmer gave that it was very dangerous to go near the wires. Carroll however, being curious to determine if the wires still remained charged, went to the place where they were fastened to the picket fence, and with one hand on the fenec reached out the other within a few inches of the wire, when he received a shock which killed him. He was twenty-four years old at this time. The company had permitted the broken wires to remain tied to the fence for twenty hours. The following extracts from the opinion state the rules of law: "Without attempting to discuss the defendant's alleged excuse for failure sooner to discover the break in the wires on the branch line, we shall take for granted that permitting a wire charged with 23,500 volts of electricity to remain for twenty hours, fastened to a picket fence, beside a public highway, in such a condition that any living creature coming in contact with such wire must necessarily suffer death, affords prima facie evidence of negligence." And as to Carroll's contributory negligence, the Court said: "When Minnick, in fastening the wire to the fence received a shock, George Hempe's back was so turned that the latter could not say, of his own knowledge, whether the injury resulted from direct contact with the wire or by coming within the danger zone thereof and though Hempe told Carroll of such injury, the testimony does not show that Carroll had any greater knowledge of the hurt than Hempe possessed. It would seem reasonable to be implied, however, that Carroll was told that such injury was caused, not by contact with, but by approach to, the wire, for Hempe testified that he informed him that Minnick put his hand out 'towards' the wire. If it be conceded that Carroll supposed that Minnick was injured by touching the wire, does the law in such case recognize a distinction between knowledge of the existence of a dangerous instrumentality and recognition of the risk incident thereto? An affirmative answer to this question would permit a stranger to touch any machinery which was running so rapidly as to impart no notice of its motion, in order to satisfy his curiosity, and if in making the demonstration any injury was sustained, the owner of the instrumentality would be liable therefor if he was negligent in permitting such appliance to remain exposed. The law imposes on a person *sui jeneris* the obligation to use ordinary care for his own protection, the degree of which is commensurate with the danger to be avoided. As danger from uninsulated wires is proportioned by the amount of electricity transmitted, contact with such wires should be avoided when their existence is known. So, too, suspicion, entertained by a person of suitable age and reasonable discretion, that a fallen wire is charged with electricity, should induce him to shun, if possible, the surmised peril, for the rule of law is that one who voluntarily assumes a position of danger, the hazards of which he understands and appreciates, cannot recover for an injury from a risk incident to the posi-

tion." The court held that Carroll was guilty of negligence in going near the wire and that no recovery could be had against the electric company.
Carroll v. Gran Ronde Electric Company, 84 *Pacific* 389.

EMINENT DOMAIN IN MISSISSIPPI.

Some time ago the Cumberland Telephone & Telegraph Company instituted eminent domain proceedings in justice court in Hinds county of the above state, to acquire a right of way along that of the Alabama & Vicksburg Railroad Company, whereupon the latter began injunction proceedings to prevent the telephone company from proceeding. Section 195 of the constitution of Mississippi declares that telephone companies are common carriers. Subsequent to the eminent domain proceedings the Cumberland company began further eminent domain proceedings in the name of the Mississippi Telegraph Company, a corporation which the railroad claimed was a mere "dummy" of the telephone company, and that the latter was using it for the purpose of doing through it what it could not do itself. We quote the opinion in full, which is of general interest: "Whatever may be the true rule of interpretation as to whether the phrase 'telegraph company' necessarily embraces 'telephone company,' as held in many authorities cited by the learned counsel for appellee, it is quite clear, in our state, that telegraph companies and telephone companies are treated, and have always been treated, as separate and distinct companies. Chapter 38, page 93, of the Acts of 1886, was manifestly repealed by the provisions of Code 1892, sections 854-858. * * * There is nothing in the constitutional provision referred to which conferred upon telephone companies any authority to exercise the right of eminent domain. It results from these views that the Cumberland Telephone & Telegraph Company was without any authority under the law to exercise the right of eminent domain in this case. Irrespective, therefore, of the question of * * * failure to answer the crossbill, * * * since the Cumberland Telephone & Telegraph Company had in no event power to exercise the right of eminent domain, the action of the court below * * * was erroneous. Turning, now, to the case of the Mississippi Telegraph Company, it is just as clear that that company was duly and regularly incorporated under the laws of this state as a telegraph company, and under our laws had the right of eminent domain in this case. The sole objection to the exercise of that right by the Mississippi Telegraph Company set up * * * is that it was but a dummy for the Cumberland Telephone Company, had no capital stock, and was organized for the sole purpose of enabling the Cumberland Telephone Company to do indirectly what it could not do directly, and that its organization and incorporation were consequently unlawful; but whether the Mississippi Telegraph Company is a properly organized company under the laws of this state is a question between it and the state, not to be inquired into in this proceeding by the railroad company."
Alabama & Vicksburg Railway Company v. Cumberland Telegraph & Telephone Company et al, 41 *Southern* 258.

PROXIMATE CAUSE OF INJURY—NORTH CAROLINA CASE.

The following facts formed the basis of a suit for damages in the above state which has recently been before the supreme court: The Forest City Telephone Company owns a line in Rutherford county. Certain road workers had dug too near a certain pole, and as a consequence it was left in a dangerous position. Notice of this was given a linesman of the company, but before it was attended to the pole had fallen down across the highway with the wires remaining fastened to it. One Carpenter, going along the road with a wagon, wished to pass the pole, but found that it had obstructed the road. He thereupon secured the services of two others and the three lifted the pole back in position and propped it up in a manner which Carpenter thought was safe. Subsequent, the pole fell and killed lady who was passing.

The question presented was whether the company was liable for the death in as much as no one would have been injured had not a third party, Carpenter, interfered by raising the pole after it had fallen to the ground the first time. The court was asked to give the following instruction to the jury: "If you find that the defendant was negligent in leaving the pole standing in an unsafe and dangerous condition, it cannot excuse itself by showing that the pole had already fallen and was replaced by a third person a short time before the fall which caused the injury, unless you find that the falling of the pole and its replacement was an unnatural occurrence of an event which would not ordinarily be expected and anticipated by a person of ordinary prudence in the natural and ordinary course of events." The case did not go to the jury, but the judge intimated that he would charge to the effect that he company was not liable if after the pole had fallen down of its own accord and some new intervening act, that of Carpenter, came in to revive the danger, a condition foreign, as the judge believed, to the danger originally brought to the notice of the company. The supreme court took the view of the plaintiff's counsel, saying: "Carpenter, traveling along the highway, in order to clear the same and make a passage way, put the pole back in position from which it had fallen and from which it later fell again and killed the intestate, and the act of Carpenter, with resultant injury, was one which the defendant might have reasonably foreseen as a consequence of his original negligence, in such case the intervening act of Carpenter would not prevent the primary negligence from being the proximate cause of the resultant injury. * * * In rejecting this principle * * * his honor decided * * * that notwithstanding the fact that defendant may have been negligent, if Carpenter put the pole back in an insecure position from which it was likely to fall and injure one on the highway, and it did so fall and cause the injury, this would so break the sequence of events from the original negligence as to prevent same from being the proximate cause of the injury, and would shield defendant from responsibility; this, we think, was error. * * * Though Carpenter was guilty of negligence in replacing the pole so that it threatened injury and was likely to fall, and did fall and kill the intestate, this would not necessarily avail to protect the defendant. * * * We think it the correct rule that, except in cases so clear that there can be no two opinions among men of fair minds, the question should be left to the jury to determine whether the intervening act and the resultant injury were such that the author of the original wrong could reasonably have expected them to occur as a result of his own negligent act." One of the judges dissented from this view of the law as applied to the case at hand. It would seem only reasonable to say that no fair minded jury would ever say that the act of Carpenter could have been foreseen by the telephone company, but under the decision some jury will have the opportunity to pass on the question and, as the case will be tried again, it will be of interest to note the result.
Harton v. Forest City Telephone Company, 54 *S. E.* 299.

Mexico is eagerly seizing every opportunity to extend its telephone system. With two rival telephone companies connecting in Torreon, Gomez Palacio and Lerdo, the former city in Coahuila and the two latter in Durango, that section is reported as enjoying one of the best services in the republic. Each company is branching out into the country, many of the larger haciendas being connected with the cities by wire.

QUESTIONS AND ANSWERS

By J. C. Kelsey

When I wrote to you earlier in the year, I did not imagine any attention would be paid to the matter of phantam circuits, but I note with pleasure that G. W. K., North Dakota, refers to my article in August TELEPHONY. It occurs to me that duplexing is destined to become more popular because it incraeses the earnings of a plant without materially increasing the expense, and the patrons are none the wiser. It is especially convenient in those portions of a city where cable is not plentiful and the company is not inclined to add more cable

The "Questions and Answers" department in TELEPHONY is always very interesting to me, and I believe it is appreciated even by those who never use it for direct information. There are times when the smallest suggestion in the department becomes valuable. I am inclined to think that "Questions and Answers" will become more technical in its nature. In reading TELEPHONY, I begin with the advertisements on the front page and go clear through the issue to the back page. I read your department closely, and was especially attracted by the article on "Freaks of Lightning." I will give you an instance of one of our freaks: A 100-pair, No. 19 cable ends within 800 feet from our office. Entering the cable is a lead of 20 pairs, running through a marsh, which is one-half mile from the office. On the top cross arm of the lead are three toll lines which do not enter the cable. Lightning struck this lead about the center of the marsh, cutting down two pairs and completely consuming the wire for thirty feet. All of the wire in the section turned white as though it had been whitewashed. This was evidently due to the burning up of the zinc galvanizing, which adhered to the wire. There was no damage to polls and but one cross arm was splintered. This charge went into the cable box, burned out the pot-head wire to within two inches of the pot head and charred the box inside. None of the heat coils inside the terminal room operated, although on part of the board was damaged.

I would like to have J. C. N., Missouri, know that I am successfully operating a lamp line toll board and four transmitters with 12-volt storage battery, according to his plan. I am using four No. 7 Stromberg local battery transmitters, using impedence coils

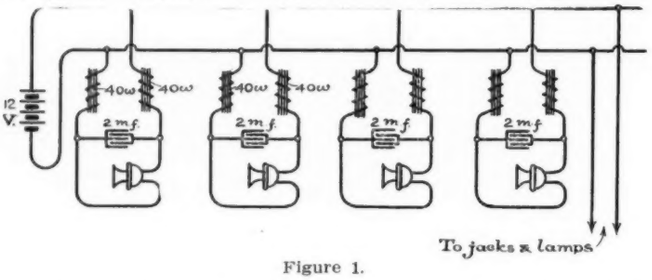


Figure 1.

wound to 40 ohms. This ohmage may have to be varied to suit other transmitters, but my experience tells me that most transmitters will work good on four volts. I use eight impedence coils and four 2 microfarad condensers for the four transmitters. Forty ohms permits enough current to pass for our purposes and the condensers pick up the lag, keeping the transmitters normal, and it also prevents the noise of the charging machine from interfering. We use the current direct from the machine to operate all our transmitters, lamps and transfers when we are charging. We have but one set of storage cells. To perform this "feat" we made no change in our induction coils or local battery transmitters. The diagram herewith shows our connection.—J. W. S., Indiana.

This letter from J. W. S., Indiana, is the kind that makes my connection with TELEPHONY really worth while. J. W. S. touches upon three important topics, and his knowledge of handling them indicates that he is alive to the interests of his company. The duplexing scheme of G. W. K. has brought so many inquiries that I will give the full name and address. G. W. K. is G. W. Kotts, Hope, North Dakota, and I personally know that he is giving good results. By giving Mr. Kotts' address I am encouraged to believe that some letters will be directed to him, and he can then correspond direct to the party interested.

If I understand correctly the idea of G. W. K., he connects his lamps like the inclosed diagram. Will such an arrangement give two separate circuits free from cross-talk?—H. S. R., Maine.

I do not clearly understand how G. W. K. "creates" two lines out of one metallic circuit, nor how the third metallic circuit is made out of two metallic circuits with the use of eight lamps. I would like to see a diagram showing the method employed.—M. J. C., Ohio.

I have tried G. W. K.'s phantom scheme according to the inclosed diagram, but it did not prove successful. The phantom cross-talked with the metallic and when it was on, I was unable to ring our other switchboard on the circuit. Will you please tell me what is wrong with my diagram?—M. L. G., Misouri.

Will you please explain the phantom circuit and its uses?—F. I. V., Oregon.

Inasmuch as I have now given Mr. Kotts' address I will ask these inquirers to write to him direct. H. S. R.'s question concerning cross-talk is a fair challenge to the non-inductive lamp bridge, and I would prefer to leave the matter with the inventor and user to explain more fully.

A phantom circuit is one which adds an operating circuit that may be used without interfering with the original purpose of the line. A talking circuit may be leased for telegraph purposes without affecting the circuit. A metallic circuit may be made to perform the functions of a grounded circuit. Two metallic circuits will perform as three metallic circuits. I have previously said in TELEPHONY that a phantom circuit was, at best, an unsatisfactory one. To accomplish the added "something" another thing must be slighted. I recall that one manufacturer was going to give me a successful demonstration that would work under all conditions. This manufacturer failed to keep his promise.

The normal method of operating a phantom circuit is to bridge an inductive resistance across the line, and tap its middle point. If a current enters the middle point of the bridged coil, it divides equally over each wire of the circuit, and neutralizes any effect on the original circuit. By having the bridges on each end of a circuit with the earth as a return, the middle points being brought out constitute a second circuit. Two metallic circuits may have four bridges, and the middle points will constitute a third complete metallic phantom circuit. The word "phantom" implies mystery and for telephone purposes a line may be employed without material evidence of its presence. If a really successful scheme could be devised that would make possible its practical use it would be a great thing for the telephone industry. I hope G. W. K. and J. W. S. have discovered something that will prove useful to all.

I have tried nearly all of the remedies proposed by S. E. C. in August TELEPHONY, concerning the freezing of ringing armatures, but find that they only remove the difficulty temporarily. We have taken out the ringers that were troublesome and have exchanged them for new ones. The manufacturer advises that its engineers can find nothing wrong with the ones we returned and the new ones that have been sent in exchange always worked satisfactorily. The trouble seems to be worse in winter, although we have bad cases in summer. Our system is grounded and it is possible the grounds may have been weakened by the winter frost. Some locations seem to be more troublesome than others. We have had all kinds. I have in mind a particular instance with a telephone that was installed last November. The instrument had been used a few days on a line just as heavily loaded and was out about seven miles from the central office. In the first location, it had not given trouble, but in its second location the trouble appeared immediately. I let it go for a month and then took out a new ringer. The new ringer worked fine until about three weeks ago, when I was again obliged to substitute a new one. I am naturally seeking a permanent cure for this trouble. The affliction has no regard for the manufacturer of the ringer, or it affects all alike. I am sending you to-day one of these sticking ringers. I have marked the package requesting that it be handled carefully and hope it will not have been jarred

in a manner to make it lose its sticking properties.—B. J. R., Minnesota.

The sticking ringer trouble is as much of a mystery to me as it ever was. The first "afflicted" ringer that I ever saw had the armature attracted to one of the cores and was held in such a manner that the ordinary magneto current could not dislodge it. The ringer received from D. J. R. was of another type, and it certainly was of the sticking type. It had all of the modern precautions, but it sticks and continues to stick. It has been entirely dismantled, and the defective part has failed to disclose itself. Every part had been carefully annealed, and seemed perfectly normal. I would like to enlist all the information possible, and would respectfully urge that all operators who have had experience with this trouble lend every assistance in order that it may be overcome. There must be a solution, and I hope by this method to find it when all operators will be given the benefit of our united efforts. This trouble is most frequently met with on heavily loaded lines. The ringing pressure on a 20-party line is very low, supplying at times scarcely enough energy to overcome residual effects. Inasmuch as this trouble is encountered on metallic as well as grounded lines, there seems to be no reason to blame external effects.

On a metallic line without central office connection, there are bridged three ordinary telephones with 1,000-ohm bells. It is intended that this shall remain a common party line; but in the event any one of the three subscribers wish to convert it into a selective ringing line, how may it be accomplished by using knife-switches? In its normal condition when one bell rings, all will ring. By using knife-switches, can it be arranged so that No. 1 may ring No. 2 or No. 3 secretly? In other words, can this be made a selective ringing line which will permit anyone of the parties to make it so at their discretion, but upon hanging up the receiver, it will revert to a party line again with all instruments bridged in to ring together. If the telephones were of the series type, then it would be a very easy matter by using three wires or two and the ground and three double-throw, single-pole knife-switches. The accompanying diagram attempts to show this method. For use as a party line the switches are not to be used at all, but as a private line this method will make it selective. I am anxious to know how the same result may be attained with bridging telephones.—R. N. T., Arkansas.

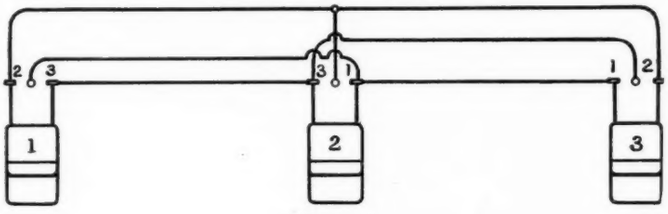


Figure 2.

I am frank to confess that I have no answer. The problem may be a simple one, but it is too deep for me. Figure 2 shows how the thing desired might be accomplished if the three telephones were of the series type. I will depend upon some of my readers to offer a solution.

We have a magneto system and the equipment is good. We have 190 subscribers, 50 business telephones and 140 residence telephones. The rates charged are $2 for business and $1 for residence. The town has a population of 3,000. The problem of moving our switchboard from one building to another is the excuse upon which the president of this company is inclined to favor the adoption of common battery service. I am inclined to think that it would be very extravagant, unless we were assured of, at least, five or six hundred telephones. I would be glad to have your opinion. —H. H. H., West Virginia.

Unless your present plant is entirely dilapidated I quite agree with you. I have always looked with favor upon local battery service. I have lived in a city which had a telephone system serving more than 2,000 subscribers, using magneto system. Analyzed closely, it was a pretty bad system, but I learned with four years' experience with it that the necessity for common battery service often exists only with the telephone company management. I know of magneto plants, both multiple and express, that are still good, and if the owners of the plants would dismantle them I would want to make inquiry as to their sanity. It is the practice of the Bell company to charge everything possible to maintenance. It is not an uncommon error that Independents charge everything possible to new construction. I am inclined to think that the president of your company would not care to charge a new plant to maintenance. He would more than likely list his assets as one old plant plus one new plant. Your question is purely a financial one. Does your present earnings justify changing the plant to common battery? Can you scrap the old plant without calling on your stockholders?

It is quite probable that I take the future of plants too seriously. Many systems are torn out without justification and the old equipment is supplanted by the new. In many cases, this is warranted, but in most cases it is not. If telephone systems were like the old family cow which furnishes the where-with-all for all the family—milk, cream and butter—it would be different. In the end you can sell the old cow to the butcher for more than she is worth and buy a new and cheaper one. The old telephone plant which is usually milked pretty hard for a few years, when put up for sale, does not bring anything. A telephone plant that is not managed with a view to the far future is like a man who does not save. They will both come to grief.

BUILT FIRST TELEPHONE LINE IN WEST.

J. R. Whitney, of Carroll, Iowa, claims to be one of the first telephone line builders in the West. While attending the Iowa Republican state convention at Des Moines recently, Mr. Whitney told of his pioneer work in the telephone business. "I remember well the first telephone line built in the West, for I helped to construct it," said he. "It was about a mile and a half long and ran from my father's grain office to the depot and was used for transmitting telegraph messages and keeping track of delivery wagons. It was a novelty in the country. We lived at that time in northern Illinois, west of Chicago. That mile and a half telephone line was built before they had telephones in the city of Chicago.

"Marvin Hughitt, now president of the Northwestern railroad, was going through our town and his train stopped there to meet another, for the double track road was not then known in the West. Some one told him about this telephone line and he went into the telegraph office at the depot and called us up on it and talked over it.

"We ordered the telephone from the makers, after seeing it explained in the Scientific American. With it came the directions in ink in handwriting, not printed. We were asked for a testimonial later as to the success of the machine. Think of a testimonial to the excellence of a telephone.

"My brother and I built the line while our father was out of the town and when he returned he declared it was nonsense to talk about being able to talk over it. But he soon was convinced. My brother and I proceeded to collect tolls from him for using it thereafter in his business, so I regard myself as one of the original proprietors of a telephone line in the West."

RAILWAY DEPOT TELEPHONES.

The corporation commission of Virginia has taken steps to enforce the act of assembly requiring all railroads to maintain telephones in their ticket and freight offices, and the commission has issued an order to the roads giving until September 1 to install the telephones for use of passengers and patrons of the roads.

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EDITORIAL DEPARTMENT

LATZKE'S "FIGHT WITH AN OCTOPUS."

AN APPEAL to our "good red American blood" is never made without response, if it is based on sound principle. The American instinctively loves fair play and hates duplicity. It is only necessary to get before him the real facts on the right side of any case to win his adhesion to that side. There is trouble, sometimes, in getting the right facts in the right way and it often requires patience and reiteration to force an understanding. But in the end, there is never doubt of the result. Get your facts, hammer them in, keep hammering and you will have the people with you. That is an unfailing axiom. This being so, we believe that Mr. Selden, in his description of Paul Latzke's forthcoming book printed elsewhere, speaks advisedly when he says that it is the most important work ever done in the Independent field. It was a thing that was lacking all these years. In and out of season, the Bell press bureau and the Bell agents have been at work, driving it into the public mind that the telephone is a natural monopoly, that telephone competition means telephone worry, that the whole Independent fabric is based on the flimsy schemes of promoters, and that investors in Independent securities must inevitably lose their money. The constant iteration and reiteration of these facts in the daily and weekly press, was not alone a source of constant and grave danger to all interested in the Independent business, but it was, as well, irritating to a point almost unendurable. To know the facts as they are, to know that telephone competition was the best possible thing for the public, and that investment in Independent properties was infinitely more secure and more profitable than any Bell investment could possibly be, and yet to have the contrary firmly fixed in the public mind by the constant misuse of the public press, was a condition to exhaust the patience, as well as to try the strength, of any man in the Independent ranks who understood his business. For years, the Independents, in their county, state and national conventions, have voiced the cry for relief from this condition. They have sought, and until now in vain, for some competent leader who should take up for them the cudgels and meet effectively this constant undermining through the medium of the public print. The quest seemed hopeless until suddenly there appeared the series of articles by Mr. Latzke in "Success" magazine. It is no wonder that they were acclaimed from the Atlantic to the Pacific, by the operator in the little village exchange to the president of the great Metropolitan company. Hundreds of thousands of copies of the magazine were ordered in various parts of the country for general public distribution, and there are thousands of testimonials to show the effectiveness of this work. TELEPHONY was among the first to appreciate the vast far-reaching influence that this series of publications was exerting, and when the opportunity came to perpetuate this influence, the publishers of this paper eagerly availed themselves of the chance. They realized that, efficient as had been the serial publication, this efficiency would be tremendously increased by perpetuating Mr. Latzke's facts in permanent form, and securing for it general reading throughout the United States. Fortunately, for us, we have been able to carry out this plan in a manner that we believe will meet with the enthusiastic approvel of every Independent telephone man in the country. With Mr. Latzke's assistance and co-operation, the work is now offered in book form to Independent telephone operators and others who are interested in spreading the true facts of the Independent movement before the people, on a basis that should make it possible to circulate at least a million copies of this book. To popularize it, still more than it was in its original shape, Mr. Latzke changed the title from

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"Fighting the Telephone Trust" to "A Fight with an Octopus." The motive is evident. A title such as this will attract and hold general public interest, and once this is secured, the reading of the public is a matter of course, for the story that Mr. Latzke tells has all the power and dramatic force possible only with the trained writer. The physical make-up of the book is in accord with the high character of the author's workmanship. It is printed on fine laid paper with the title page and cover plate in two colors. The illustrations are done in brown half-tone tints on heavy coated paper. In order to make it possible to spread the work broadcast, TELEPHONY has started out with an edition of 250,000, which will be sold at the price of 12½ cents a copy in lots of 500 or more. Large advance orders, running from 40,000 down to 100 and aggregating over 100,000, have already been received on the preliminary announcement sent out, and we believe we are safe in predicting that the ultimate circulation of the book will be even greater than we expected. It is being bought in large quantities by the managers of large and small plants to be put in the hands of all of their subscribers, and, in addition, bankers and others interested in investment securities are putting in orders for books to be sent especially to investors and others controlling the placing of funds in public service securities. The book will cement most effectively the strong American sentiment on which the Independent movement is primarily based, and it will open the eyes of the investing public to the possibilities that lie in Independent properties. Moreover, it will put a sharp check to the work of the Bell Press Bureau. A copy will find its way into the hands of every newspaper proprietor and editor in America, and these men will for the first time get an adequate idea from the graphic story of Mr. Latzke's regarding the enormous industry which has grown up in the Independent telephone field.

THE DANGER OF PATRONIZING KELLOGG.

REPLYING to an editorial published in the last issue of TELEPHONY regarding the attitude of Independents toward the Kellogg Switchboard and Supply Company, one of our subscribers protests against what he calls the "persecution" of this corporation. He holds that so long as the Kellogg company supplies first-class material, at fair prices, it ought to be treated on the same plane as other manufacturing concerns and that the efforts to organize sentiment against it is "unwarranted and unbusiness like." Nothing better illustrates the danger of the Kellogg company under its present management than this attitude of a man who is engaged in the Independent telephone business. Through the insidious work of its representatives this company has actually succeeded in making this man—and there are others like him—believe it is entitled to be treated as any other concern that is out in the field seeking business along ordinary honest lines. Should such an impression by any chance become at all general, the Bell company would indeed have received full value for its investment in the Kellogg conspiracy and the disintegration of the Independents would begin in full earnest. Fortunately we do not deem it possible that any considerable body of Independent telephone men could be so shortsighted as to forget the true attitude of the Kellogg company. The facts are so simple and the menace so great that any school boy should be able to reason out for himself why no Independent telephone man can under any circumstances, afford to enter into business relations with the Kellogg company, or to have anything to do with any of its agents.

What was the motive that inspired the Bell company to buy the Kellogg company? Why did Mr. Frederick P. Fish, president of the American Telephone and Telegraph company, and Enos M. Barton, president of the Western Electric Company, the manufacturing branch of the Bell company, conspire to secure possession of Milo G. Kellogg's stock? Unless we are to believe these men are babies, the answer lies at hand.

It was for the purpose of injuring the Independent movement through control of one of the important manufacturing concerns on which the Independents depend for their apparatus. We have evidence along a dozen different lines to show that these fine gentlemen had hardly come into possession of the Kellogg property before they put into execution the lowest form of commercial brigandage. Hiding behind the Kellogg skirts, they manipulated the courts against the Kinloch and other companies equipped by the Kellogg, in the hope of securing injunctions that would put the Kinloch and the others out of business. And they all but succeeded. When their conspiracy was exposed and the true ownership of the Kellogg company revealed, through the action of the minority stockholders, Mr. Fish and Mr. Barton switched their tactics. They then began, through their agents, under the direction of Mr. DeWolf, president of the Kellogg company, a systematic canvass for Independent trade, in order to tie as many Independent companies as possible to the Kellogg branch of the Bell so that they might, when the time was ripe, close in on the operating company and squeeze it out of existence. And it is incomprehensible that any Independent telephone operator should put himself in the position where the Kellogg branch of the Bell trust is able to inform itself of his financial status and of his business connections.

The most unsophisticated man must know that full reports regarding its dealings with Independent companies are regularly forwarded by the Kellogg company to Mr. Barton, in order that the conspirators at headquarters may be fully advised as to the condition of the Independent companies who are so indiscreet as to have business associations with Mr. DeWolf's department of the telephone trust. What sort of business man is it that will foolishly put himself in the hands of persons whose mission, openly avowed, is to crush him out of existence?

Any Independent operator who has dealings of any sort with the Kellogg company is helping along the game for his own destruction. There is only one safe course to pursue. Keep away from the Bell-Kellogg company. There are plenty of Independent manufacturers in the field who make just as good apparatus as either the Western Electric or the Kellogg manufacturing concerns of the Bell company can possibly turn out. Why, then, deal with a concern that is being used as a spy by the enemy?

TELEPHONES POPULAR IN ENGLAND.

ENGLISHMEN resent the oft-repeated assertion that Great Britain is lagging behind other European countries in the development of the telephone, and have collected statistics to prove the contrary is true. These figures show that in Europe, having a total population of 380,000,000, there were, January 1, 1906, 1,675,000 telephones in service. This gives an average telephone development of 4.4 telephones per 1,000 inhabitants. Great Britain, with 42,000,000 of population, had 425,356 telephones, a development of 10.1 telephones per 1,000. Therefore, Great Britain, with 11 per cent of Europe's population, has 25.4 per cent of Europe's telephones, so that the telephone development of these benighted isles is nearly two and a half times as great as the average throughout Europe. Excluding Great Britain, the average telephone development in all of Continental Europe is only 3.7 per cent, 1,250,000 telephones to 338,000,000 of inhabitants; thus, British telephone development is nearly three times as high as the average of the rest of Europe.

In view of these statistics the Britishers claim that they are not the tail of the telephone procession in Europe. The data collected also show that in Great Britain there are 30,000 more telephones than there are in eleven countries of Europe having a combined population of 288,000,-

000. London alone has more telephones than most European countries, only three nations having more than the English metropolis. The German empire is the only European state boasting more telephones than Great Britain. Germany, with a population of 58,000,000, has 593,535 telephones, or 10.2 per 1,000 inhabitants. English authorities claim they are now installing more telephones than the Germans, however, and will soon pass their neighbors across the water.

But, after all, the Britishers are not confident of keeping up with the telephone development in the United States. On this point an English publication says:

"Whether we shall ever approach the prodigious development in the use of the telephone which obtains in America is another matter. For a variety of reasons the telephone service has entered into the life of the American people to an extent which is hardly conceivable by those who have had to struggle against the numerous adverse influences that have checked the advance of British telephony. It is commonplace now in American cities to find an exchange telephone on every office desk, on every shop counter of large shops, in every hotel chamber, even in every room of moderate-sized private houses. The exchange telephone is getting to be the inseparable companion of the American by day and by night, and he relies on it for an infinite variety of purposes. In all this we are a good ten years behind the United States. We know the main causes which have held back the telephone in this country, and there is little profit in rehashing the long story of past difficulties. But there is another cause—the innate conservatism of the British character, the general unwillingness to use the telephone properly and to appreciate the real value of the service. In the education of the public on these points American telephone practice is far in advance of ours."

THE PASSING OF GONDEN.

IN THE daily TELEPHONY of issue June 26th the attention of Independent telephone men was called to a series of articles in the "Bulletin of the League of American Municipalities," written by a Mr. H. J. Gonden. These articles were of so misleading and vicious a character that the International Independent Telephone Association took the matter up and pointed out the unfair position assumed by this writer in his attacks on the Independent telephone movement. TELEPHONY was anxious to know if the "League of American Municipalities" was aware of the fact that its name was being used as a cloak for an unwarranted onslaught on Independent interests. Mr. Gondon's articles had appeared in the League publication for five or six consecutive issues, and it seemed time to call general attention to them.

Our expose of this writer had the desired effect, as the August issue of the "Bulletin of the League of American Municipalities" appeared without its customary tirade on the Independents and instead of Mr. Gondon's article there was printed a very excellent paper by Honorable Francis Dagger of Canada on "Telephone Competition and Monopoly." Mr. Dagger is the telephone expert of the Dominion House of Commons and his paper gives an idea of the advantages of telephone competition. He deals with facts and not garbled statements as did Mr. Gondon. We wish to congratulate the editor of the League Journal on his stand in this matter and to assure him that Independent telephone men appreciate a "square deal." We understand Mr. Gondon has started a publication of his own in which he will continue to attempt to discredit Independent interests. In a recent talk with the editor of TELEPHONY Mr. Gondon denied the statement we made that he had sold 3,000 copies of the League Journal to the City and Suburban (Bell) Telephone Company of Cincinnati, stating that this Bell company bought only 2,000 copies of the publication containing one of his Bell boosting articles. Mr. Gondon admitted he was recently employed by the Nebraska (Bell) Telephone Company to make a newspaper fight in Omaha against an Independent company.

These facts are given to show that Gondon is a Bell hireling and should be known as such. If he continues his unfair tactics TELEPHONY will have some things to say that will be straight from the shoulder.

ETIQUETTE OF THE TELEPHONE.

THE more general becomes the use of the telephone the more pressing the necessity grows for a code of rules that might be named: "How to telephone." The saving in time and temper, and the improvement of the service as well that adherence to a few simple reasonable rules by telephone users would accomplish is almost beyond comprehension. Of course, to be most effective, these rules should be uniform and should be complied with by all subscribers and operators. Then we would have a condition approaching perfection in telephone communication. Until something of this sort is done there can be no marked and uniform improvement.

There should be a stereotyped manner in which to make and answer calls. The switchboard operators have their form of reply, and it contributes largely to their success in accomplishing a tremendous amount of work. How much more they could do, and how much more satisfactorily it could be done, if the subscribers conformed to the same rules of telephone conversations!

Subscribers seeking a number ask useless questions, and waste many words in asking those that are pertinent and necessary. For instance, how much easier would it be for everybody if, when the subscriber got "central," he merely called for the number instead of putting his request into a long, time-taking question? Then, when he is connected with his party, he should first announce his own name, and, if there be any doubt in his mind, courteously ask the party at the other end of the wire if this is So-and-So. Instead, most subscribers hurl an impolite query at the person called to the telephone—"Who is this?" Nine out of ten persons resent this impolite discourtesy, and the conversation begins under unfavorable conditions.

Another thing in exceedingly bad form is for Mr. A. to have his clerk or stenographer call Mr. B. on the telephone and "hold the wire" until Mr. A. is notified and takes up the receiver. Of course Mr. A. saves time and inconvenience, but what of Mr. B., who is called from his business and forced to wait the pleasure of the man who sought the interview? The average Mr. B. becomes irritated—and righteously so—at the really insolent and selfish action of Mr. A. If any waiting must be done is it not fair for the person seeking the interview to do it? Of course circumstances alter cases and some conditions compel the called party to wait, but ordinarily not only courtesy but every day justice demands that the "callee" shoulder the inconvenience if any is necessary.

Telephone communication is also facilitated by persons spelling out the number desired. Experienced and skillful operators no longer say "Two thousand and eight." It is always "Two, double O, eight," or "Twenty O eight." The letter "O" is used instead of "naught," for the simple reason it is plainer and makes mistakes less frequent. Again, the subscriber should call for the exchange first and then the number. For instance, "Main one four," not "One four main," for the instant the operator learns the exchange desired she prepares to secure the trunk line, and the fraction of a second lost waiting to receive that information amounts to a considerable time in the course of a day's work when thousands of calls are received.

It is no longer necessary to begin a telephone conversation by saying "Hello." The operator responds to a call by simply asking "Number," and when the subscriber se-

cures the desired connection time can be saved by merely stating his or her name and telling whom he wishes to speak to. These and a score of other reasonable rules will make the telephone a more satisfactory means of communication. The value of good manners at the receiver cannot be overestimated, and the saving of time is no more important often than the saving of temper. There should be a code of telephone eitquette as well as a code of conduct at the table or in a drawing room. Observance of a set of common sonse rules will make the telephone the greatest convenience of modern life. Defiance of such rules may make the telephone a positive nuisance.

COPPER PRODUCTION.

EXPERTS estimate that the production of copper in this country last year was approximately 943,000,000 pounds, or 133,000,000 pounds more than in 1904; and it is predicted that this year it will show an even larger increase. Yet at such a pace is the consumption of the metal growing that the output of ore does not meet our national needs and we are importing larger and larger quantities from across the Atlantic. First and foremost is the electrical age and the utilization of electricity is largely dependent upon copper. Transmission of electrical energy for use in lighting streets and dwellings, operating power plants and railways, and making possible communication by telegraph and telephone, is a prime factor in twentieth century living. Power transmission for lighting and manufacturing purposes, though its future possibilities are enormous, is largely undeveloped; so, to some extent, is the electric railway; so, most of all, perhaps, is the telephone, though there are nearly 7,000,000 telephones in use in the United States. All of these utilities use vast amounts of copper.

Undoubtedly the telephone system is the largest single user of copper in this country to-day, and that means the largest user in the world. Of the heavy copper wire on long distance lines, the lighter equipment of local service and the tiny filaments in the cables which constitute wire mileage of telephone companies, there is said to be 15,000,000 miles. Add to this the copper wire in telephones and switchboard apparatus and some idea may be had of the copper used in the telephone field alone.

Truly it is the age of copper, and the telephone has made it so.

TWO SYSTEMS.

THE following editorial from the Lafayette (Indiana) Journal should be read by every telephone subscriber in the United States, as it explains in few words the difference between the Independent and Bell method of doing business. Telephone managers would do well to reprint this editorial and send it to each telephone subscriber.

The telephone business of the United States is represented by two systems, founded upon two separate and opposing principles as antagonistic to each other as good and evil or light and darkness.

Monopoly is the very essence of one system, which is composed of one parent company and forty-three subsidiary companies. As the parent company owned the patents and all of the essential appliances, as well as a majority of the stock of the subsidiary companies, it was in position, before the rise of the Independents, to say who could go into the telephone business, what rate the public should pay for service, and to whom it would furnish service. Upon this principle it began business, parcelled out the entire United States to its subsidiary companies and founded the Bell system.

Independent control by each company of its own affairs is the essence of the other system which is composed of thousands of separate companies, each owning its own equipment, controlling its own stock, conducting its own affairs and exchanging service by mutual agreement. Upon this principle is founded the great Independent system.

The conflict. That these two systems are irreconcilable, that if one succeeds the other must fail, is apparent to any one who will give the matter consideration. The companies composing each are the mere exponents of the underlying principal of their respective systems. The companies composing the Bell system must stand for monopoly and be opposed to Independent ownership as long as they remain a part of that system, and their very plan of organization precludes them ever getting out of the clutches of the system intact. It is not the individual corporations composing the Bell system with which the Independents have drawn swords. It is the system itself and this conflict of opposing principles, as represented by these two systems, will continue until the Independent has freed not only the public but the shattered remains of the Bell companies themselves from the monopoly's grasp.

Between these two systems there can be no compromise. Every telephone company belongs to one or the other. Whenever any telephone company connects with the Bell system it should be treated as a Bell and promptly cut off from all connection with the Independent system. There is and can be no other course for any company to pursue and be independent.

THE BELL IN UTAH.

ON August 1 the Butchers' and Grocers' Association of Provo, Utah, threw out all the Bell telephones on account of the high rate charged and the inferior service rendered. The Bell was charging $48.00 per year and the Utah Independent Telephone Company $36.00 for individual line service. There were twenty-two in all, and not one of the association has retained a Bell telephone. With the most excellent service given by the Utah Independent Telephone Company throughout its entire system, it is pointed out there can be no reason why there should be a Bell telephone in the state of Utah within a short time.

Mr. C. G. Vickery, general superintendent of the Utah Independent Telephone Company, has been making a thorough canvass of the conditions throughout the territory in which his company operates, and believes that there will be but one system giving a comprehensive service in Utah. The Bell is losing ground, while the Utah Independent Telephone Company has been gaining at all points, so that in the future the majority of the telephone users of Utah will be using Independent telephones.

THE DRUG STORE TELEPHONE.

"WHY, yes, you're perfectly welcome to use our telephone."

That is the customary answer that people have received when they have asked to use a drug store telephone. It is the answer almost anyone would give, especially if he were in any sort of retail business, depending upon popular favor. But the fact is that the convenience of the public has become a nuisance to the druggists that very few people ever thought of. Call up a drug store and the chances are you would be told by Central: "Line is busy." Physicians wishing to order something from the drug store, or to send a prescription to be filled quickly, would not be able to get the store and would be put to the trouble of going or sending for the article. It was because of these things and many other annoyances going with the furnishing of free telephone servce that druggists are having pay station telephones installed. The free use of the drug store telephone is not fair to the druggist or to the telephone company, and if the telephones in all public places were pay station telephones, it would very quickly stop the imposition.

NO TELEPHONES AT SCOTLAND YARD.

THE report that Scotland Yard had detected the telephone is incorrect. Scotland Yard declines to detect the telephone. It refuses to have a telephone. It wants to catch thieves and murderers in the medieval style that characterizes all its methods. Efforts are being made to induce the authorities of England's head detective bureau to install the telephone, but they will fail.

The headquarters of London's fire department uses the telephone, but Scotland Yard scorns it. Scotland Yard prefers the ancient means of communication. London's criminals agree with the Scotland Yard that the telephone is unserviceable. The crooks can "crack a crib" and get far away before Scotland Yard detectives learn of the crime. "The world do move," but not at Scotland Yard.

A TELEPHONE RELAY

An Interesting Description in the American Journal of Science

By John Trowbridge

IN HISTORIES of the invention of telegraphy much stress is placed upon the invention of the telegraphic relay; for it seemed doubtless to Joseph Henry and to Morse a complete apparatus for indefinite extension of the telegraph over land. In the progress of the telegraphic art, due to better lines and improved instruments, the telegraphic relay has lost the pre-eminent position it once occupied in men's minds; and the long discussions in the various treatises on the development of the art of telegraphy, in regard to the priority of the invention of the relay, have ceased to interest practical electricians.

It is natural, with the introduction of telephony, that attention should be directed to an analogous problem, that of the telephonic relay; a far more difficult problem than the telegraphic relay; and the future historian of the progress of telephony will find it difficult to analyze the work of hundreds of inventors who have sought to solve the problem.

When we consider that the telegraphic relay merely re-

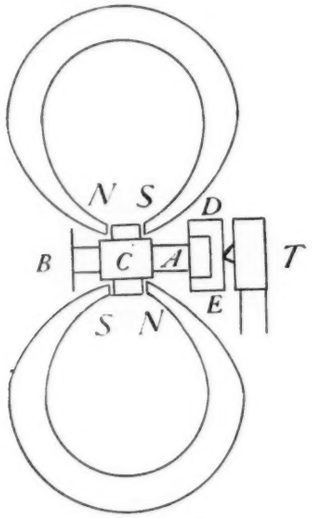


Figure 1.

sponds to one throb, so to speak, one inarticulate impulse, while a telephonic relay must reproduce the whole range of the human voice, we begin to realize the demand that the invention of such a relay must make upon both scientific knowledge of sound and of electricity and magnetism; and above all, upon mechanical skill. It does not, therefore, seem inappropriate to discuss in this journal, which contains much of the work of Joseph Henry, some scientific points in connection with a telephonic relay.

The earlier inventors who attacked the problem naturally thought of the simple device of applying a microphonic contact immediately to the vibrating diaphragm of a telephone, hoping to repeat the almost infinitesimal vibrations of this diaphragm, and to give them an increase of energy by a local battery. This attempt is an application pure and simple of the principle of the telegraphic relay and therefore marks no progress in the art; for it was not new in principle and furthermore it did not work. The application of the microphonic contact loaded the diaphragm at its most sensitive point and thus prevented the vibrations which one sought to repeat; moreover, the vibrations of the diaphragm are too minute to cause a sufficient agitation of the microphonic contact.

The next step in the mind of the inventor was to endeavor to increase the vibration of the center of the telephonic diaphragm by a lever. This arrangement was found to be inoperative, for the short arm of the lever exercised a prejudicial pressure on the vibrating diaphragm; moreover, the fundamental vibrations of the lever were superposed on the

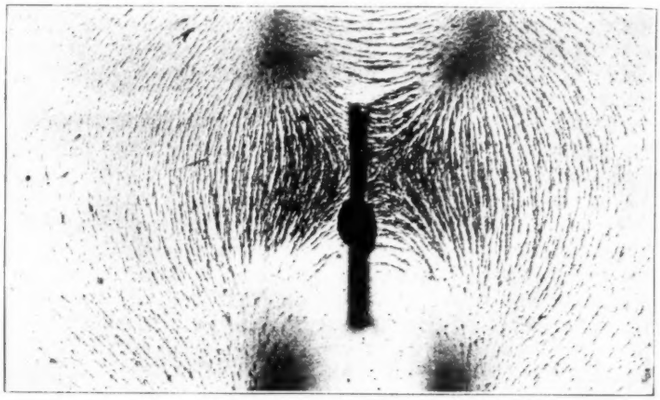


Figure 2.

vibrations of the diaphragm, thus completely confusing speech.

It was perhaps natural to suppose that a number of microphonic contacts placed on a number of telephonic diaphragms, the telephones being arranged one after the other in tandem, might gather, so to speak, the slight vibrations of each and throw them in a united volume upon the relay line. This chorus arrangement, however, is also a failure; for the united speech is confused; much as if a number of persons singing the same note, some through the nose and others imperfectly, should undertake to transmit the note through a number of telephones. The imperfection of each microphonic contact disturbs the final result.

It must be remembered that the telephone is after all an imperfect instrument and its wonderful adaptiveness is greatly aided by the human brain, which catches at the

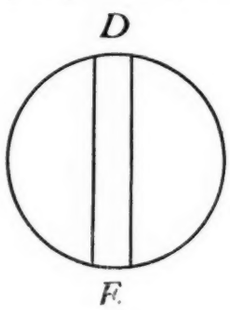


Figure 3.

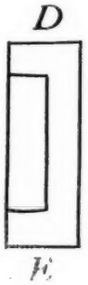


Figure 4.

connection of thought. This can be seen if individual words are transmitted without context. It will be found that the call girl will ask you to repeat such a collocation as "superstitious zoological veneration." Moreover the amount of energy utilized in the telephone is extremely small; most of the energy of the currents which actuate it

and transmit speech is dissipated in heat. Some observers think that less than one per cent of the energy of such currents is transformed into sound waves. We see, therefore, that the problem of the telephone relay calls for all our electrical and mechanical aids to preserve and to transmit this small percentage.

Since mechanical enlargement of the vibration of the telephonic diaphragm by levers is out of the question, the next more promising step seemed to be the bringing in, so to speak, of electromagnetic energy, and it has been proposed to cause the telephonic currents on the circuit to be relayed, to react by induction on a neighboring circuit at several points. This method gets rid of mechanical pressure on the vibrating diaphragm of the telephone, and substitutes an electrical pressure without any visible connection between the circuits. This method also is ineffective. It has, however, a certain analogy in another and more successful attempt to utilize an invisible and intangible magnetic effect without bringing a mechanical pressure on the telephonic diaphragm; this method consists in causing the telephonic currents to disturb a piece of iron, a balanced magnet, or a suspended coil in a strong magnetic field such as is found at the center of an electromagnet or between the poles of a strong permanent magnet.

The principle of this method is that of the siphon recorder, the invention of Lord Kelvin, which is used on ocean cables. Since the current on the cable is very feeble, and cannot work ordinary telegraphic instruments, some method must be used to magnify or to record the signals. The method adopted by Lord Kelvin was that of a delicately suspended coil so placed between the poles of a powerful magnet that when the feeble currents passed through this coil it oscillated; for the feeble currents animated the coil making it an electromagnet, the poles of which sought the poles of the powerful stationary magnet. Thus a very feeble electrical current could be detected by the powerful magnetic influence to which it was subjected. Here we have a mechanical movement, the movement of a vibrating system, produced without the intermediation of visible connecting parts. The same principle has been adopted in many forms of instruments for detecting and measuring electrical currents, both in laboratories and in commercial electrical installations.

It has, therefore, occurred to many minds that by the use of this principle of magnifying the vibration of moving parts by the reaction between the feeble currents in such parts and the environment about these parts, one should be able to strengthen or repeat such vibrations. The mechanical difficulties, however, are very great if one endeavors to apply this principle to the problem of the telephonic relay. A delicate suspension such as is used in the siphon recorder or the D'Arsonval galvanometer is out of the question; and a rigid suspension prevents the turning movement. the seeking of the poles of the powerful magnet by the little coil which conveys the feeble currents. A certain measure of success, however, can be obtained by careful adjustments in a laboratory; but the utilization of the turning movement of a little coil in a magnetic field has not yet proved of commercial use in telephony.

We are apparently brought back to some modification of the simple principle of the disturbance of a powerful magnetic field by the effect of feeble currents circulating around coils placed in such fields. Suppose, for instance, that we have a hollow electromagnet with another electromagnet suspended above it, the iron core of the suspended magnet forming a part of the core of the stationary more powerful electromagnet. The system can evidently be balanced, in various ways; for instance, the suspended magnetic core can be maintained in a definite position by connection with a telephone diaphragm; and when a feeble current circulates through the coil of such a suspended electromagnet its position with respect to the stationary coil is changed. Instead of the diaphragm of a telephone, it is evident that a diaphragm connected to a microphone contact can be employed. This idea can be found in the efforts of many inventors to construct a relay. Professor Dolbear has described a telephone which works upon this principle; a nonmagnetic diaphragm placed close to the pole of a permanent magnet carries a little electromagnet which is balanced under the influence of the elasticity of the diaphragm and the magnetism of the permanent magnet. When the voice causes the diaphragm to vibrate, the movements of the little electromagnet disturb the magnetic field, producing feeble currents of induction in the little moving coil which transmit speech to a similar piece of apparatus. If this similar receiving apparatus of Professor Dolbear had been employed to modify a microphonic contact, it would have been the precursor of many subsequent inventions.

Instead, therefore, of the turning or torsional effect relied upon to actuate Lord Kelvin's siphon recorder—called "Siphon" because a siphonic pen records the oscillations of the vibrating coil—we have efforts to utilize the to and fro thrust of a vibrating core of an electromagnet whose position in a powerful field is modified by the strength of the feeble telephonic currents which circulate around the core of such a magnet.

At first sight it would seem that the inertia of the suspended electromagnet, or that of its core or plunger, if the coil of the electromagnet is fixed, would be so great that the motion of the microphonic contacts would be seriously impeded. It is true that the weight of the vibrating parts in this form of relay must be small, and there must not be any subsidiary vibrations of the moving parts which might be superposed upon the vibrations due to the telephonic currents. It is evident that such subsidiary vibrations can arise if the moving parts are long and of considerable size. With a loaded microphonic contact we can have feeble effects or roaring sounds, as if the membrane of the ear is loaded by an obstruction.

In this form of telephonic relay we, therefore, have a microphonic contact connected with what may be called an iron plunger, the position of which in a magnetic field is modified by changes in its magnetism by surrounding feeble telephonic currents. The only mechanical connection is that of this moving plunger with the microphonic contact.

The magnetic part of a relay embodying the above ideas can be suitably constructed so as to perform their part to a commercial degree of perfection; the principal imperfection of the relay arises from the microphonic part. Among such imperfections the most notable one is the roaring or "growling" of the microphone when a strong battery is used to get the greatest degree of sensitiveness from it. This noise, which arises in great part from crepitations produced by heat, can completely overpower telephonic transmission of speech. This crepitation is greatly enhanced by the direct connection of the plunger or moving electromagnetic coil with the microphonic contact; for the movements in the magnetic field and the crepitations in the microphone get into a swing together, mutually aiding each other. This mutual action is one of the greatest barriers to the perfection of a telephonic relay in which a close connection exists between the parts moving in the magnetic field and the microphonic contacts. To overcome this defect would be a great service to the art of telephony.

It is thought by some that this crepitation noise is analogous to that of the singing electric light arc; it can be started in any transmitter either by too strong a current or by a suitable reaction between the vibratory motions in the transmitter and the current in the telephone circuit of which the microphone is a part, for instance the roaring can be started by holding a telephone connected with the circuit directly in front of the transmitter.

With the view of accomplishing two results, I have constructed the following form of telephonic relay. These re-

sults to be attained are as follows: First, the prevention of the reaction of the magnetic parts on the crepitation of the microphone to obviate the excessive roaring or "growling"; secondly, to provide means for a separate adjustment of the magnetic moving parts and the transmitter. This separate adjustment is evidently highly desirable; for the part moving in the magnetic field may be in a suitable position for the greatest sensitiveness, while the microphonic contact has not a suitable contact pressure; and any disturbance of adjustment of one of these parts of the apparatus disturbs the other. In accomplishing these results, the fact came out with great clearness that the separation of the microphonic contact by means of an air chamber from the magnetically moving parts, a separation claimed by many inventors, is inoperative unless there is a better sound-conducting medium between the microphonic contact and the vibrating part in the magnetic field than the layer of air. In fact, the layer of separating air is incapable of transmitting the feeble vibrations of a telephone diaphragm sufficiently for relaying; while a suitable solid sound-transmitting support to the microphone in contact with the edges of a diaphragm actuated by the movements in the magnetic field transmits such vibrations very efficiently. This is an exemplification of the fact that a person partially deaf can hear if the vibrations are conveyed to the ear by contact with the support of the ear.

Considering thus the principle involved in the construction of a practicable telephonic relay, I have invented the relay described herewith; a relay in which the barrier of undesirable "growling or roaring" is obviated; and a relay which permits of the desirable separate adjustment of magnetic parts and microphonic parts.

The relay consists of a small coil with a laminated iron core, which is balanced by two small diaphragms in a balanced magnetic field: the telephonic currents to be repeated or relayed enter the little coil and disturb the magnetic balance in the magnetic field.

In Fig. 1, *NS* (diagrammatic) represent the poles of the magnetic field, *C* the moving coil actuated by the telephonic currents to be relayed, *A* and *B* the supporting diaphragms, *DE* sound-communicating support of the microphonic contacts or transmitter. This can be a heavy disc: in some experiments I have used a brass disc one-half an inch thick and have relayed loud and articulate speech. The main features of this relay are these: the magnetic field acts both in the direction towards *B* as well as toward *A*.

Fig. 2 shows by the lines of magnetic filings the character of this magnetic field. This arrangement may be considered a modification of the principle of the siphon recorder of Lord Kelvin, in which a to and fro thrust or vibration takes the place of the rotating or turning effect of feeble currents actuating a small coil suspended in a strong magnetic field.

The second important principle is the freedom of the central portion of the diaphragm *A* from the pressure of the transmitter *T*. The third point is the transmission of the vibrations of this diaphragm *A* by means of the sound-transmitting support of the transmitter to the transmitter *T*. As I have already said, the air enclosed in the chamber *DE* plays a very small part in the transmission of the vibrations of the diaphragm *A*. A proof of this important fact is as follows:

Fig. 3 represents a front view of the support *DE* of the transmitter, which in this case consisted merely of a metallic bar. Fig. 4 is a side view of this case. Here the air space between the transmitter and the diaphragm *A* is not enclosed, being open on both sides of the bar, which is connected at its edges with the diaphragm *A*. The transmission of speech in this case is loud, while if the connection at *D* and *E* with the diaphragm are removed and the bar upon which the transmitter rests in the same position parallel to the diaphragm *A*, a very feeble sound is transmitted through the intervening air.

One can, therefore, adjust the transmitter without bringing a pressure upon the most sensitive portion of the diaphragm *A*, its center, and without disturbing the adjustment of the moving coil *C*. The relay is very sensitive; it is loud, and the articulation good. Moreover it is free from the objectionable growling or enhancing effect of the crepitation of the microphonic contacts on the vibrations of the magnetic portion of the relay. I have been much indebted to the suggestiveness and mechanical skill of the mechanician of the laboratory, Mr. George W. Thompson.

The engineering problems connected with loading telephone lines are most interesting, and when completely solved may obviate the use of relays, and telephonic engineering may go through a phase analogous to that of the Morse telegraph, in which as I have said the telegraphic relay is subordinate in importance to good conducting lines. Nevertheless we have not reached this point yet, and the cost of a relay is practically nothing in comparison with the enormous expense of a loaded line. The relay, described in this article, seems to me to be an important solution of the problem of the telephonic relay.

NEW YORK CONVENTION AT NIAGARA FALLS.

A meeting of the executive committee of the New York State Independent Telephone Association was held at Power's Hotel, Rochester, on Friday, July 27, to decide on the place of meeting of the convention for this year, and to appoint a secretary to act in place of Mr. Lane, former secretary, who has resigned.

R. Max Eaton of Niagara Falls was appointed secretary.

Niagara Falls was decided upon as the place of meeting for the convention. The date was left to the decision of the president of the association, and was set for Monday, September 3.

It is anticipated that the largest attendance in the history of the association will be at Niagara Falls on account of the natural attractiveness of the city.

Manufacturers who desire to send their representatives or have exhibits of apparatus at Niagara Falls may communicate with Mr. Eaton, the secretary, at Niagara Falls, for any information they may desire.

TO PREVENT POLE SETTING.

Many queer tactics are employed by persons who try to prevent the erection of telephone poles before their homes. The plan of the woman who had seven children and ordered them to jump into the holes as fast as the workmen dug them caused much comment several years ago. Recently similar interference was offered in Allegheny, where residents are resisting the Bell company's placing of poles on some of the streets. A Mrs. Longcart objected vigorously to the workmen locating a pole in front of her home, and when they had persisted in digging a hole, as a last resort she jumped into it, and despite threats and entreaties held the fort until the men went to dinner. Then she and her daughter filled up the hole, covered it with planks and remained on guard the remainder of the day. The company surrendered and agreed to place the pole at another place.

On Emerson street, in Pittsburg, the residents made it extremely uncomfortable for the telephone construction gang. The Bell company had its wires strung on the poles of the Allegheny County Light Company and the expiration of a contract made it necessary to erect poles of its own. One indignant householder tied a savage bull-dog near the spot selected by the digging gang, and the animal successfully kept the field clear. Finally, the dog broke his chain and chased a passer-by into a tree. Another citizen who protested against the placing of a pole in front of his residence was R. W. Guthrie, brother of the mayor of the city, who had his servants guard his frontage and prevent the construction men from planting poles near his home on Emerson street.

STANDARDIZATIONS OF METHODS AND APPLIANCES IN TELEPHONY

A Paper read before the Electrical Section of the American Institute of Electrical Engineers

By **Frank R. McBerty**

IT IS the work of the engineer to build a machine accurately fitted for a service. Ordinarily the requirements of cheap construction and proper operation are antitheses; a rough proportion is found to exist between quality of performance and labor of construction and operation. He must determine an adjustment between the quality and the cost of performance. To build a cheap machine that will not work is easy; to build a costly one that will work well is not difficult; to build a cheap one to work well is his sufficient task. The engineer then must provide a standard of performance, or a variety of standards to meet a variety of conditions. In telephony the standards must cover transmission, and promptness and accuracy of switching, since these are the particulars on which the salable quality of the product of the machine depends.

Although a rough standard of telephone transmission was established fairly early in the history of the industry, it is only recently that a rational use of such a standard has been made. With the advent of long distance lines, transmission equal to the conventional standard was found entirely inadequate for an increasing percentage of connections. To meet the new conditions, a new instrument was designed and a new standard was established, namely, the transmission from a solid back transmitter provided with two cells of Fuller battery in an aerial line of No. 8 wire, 200 miles long. In the lack of adequate data the assumption was made that all subscribers' lines would require the maintenance of such a standard transmission, and all equipments were judged in relation to the standard, with no great regard to local conditions. Doubtless in many cases the maintenance of the high standard required for connections of extreme length was not warranted by the occurrence or frequency of such connection in the locality and was needlessly costly. Studies of the percentages of conversations which are held over circuits having different resistances or losses up to the limits, which are now available, together with more accurate knowledge of the costs of maintaining different grades of transmission, now permit the determination of the quality of transmission which is adequate and suitably economical for any locality.

Ordinarily the transmission is affected by the nature of the telephone and transmitter, the resistance and insulation of the conductor, and the nature of bridges and repeating coils necessarily present in the circuit for other purposes. In determining the desirable grade of transmission, the transmitters and receivers, and the appliances in the circuit which may produce losses of energy, ordinarily can be left out of account, since good judgment in selecting and arranging appliances is more effective in reducing the cost, without impairing the efficiency of service, than any efforts at cheapening these appliances would be. In general the cross section of the conductor is the controlling consideration in determining the economical grade of transmission. Increased cross section improves transmission in a diminished proportion but it increases cost of conductor, insulation and supporting or containing structures largely. For this reason the engineer should determine for each locality, in view of the electrical losses which will be encountered in varying proportions of the probable connections, the minimum grade of transmission permissible in view of the cost of conductors. The acceptance of a single standard applied uniformly to all cases would not seem to be in the direction of adequate planning.

To take examples; a town exchange remote from a city probably will be the center of a network of toll lines extending for some distance into the country. Only a small percentage of the local calls will enter the toll lines, and extremely small percentage of those will reach such a distance as to tax the transmitting efficiency of the local system. Such a case would seem to call for a sacrifice of quality of transmission, to a considerable extent in favor of economy of construction. In the case of a large city, a considerable percentage of the conversations will be over long and profitable toll connections, while a great proportion will be through long cables. In such a case, manifestly a different standard of transmission must be established, dependent upon totally different relations between necessary grade of service and cost of giving it.

The standard of transmission should, therefore, provide a strong scale, variable within wide limits and adjustable to actual conditions.

Only recently has a definite effort been made to establish standards of performance in switching connections. Data is now available, showing the relations between cost of operating and various degrees of promptness in answering calls, and various degrees of accuracy in establishing connections. Improved service in these particulars involves increased expense in switchboards, central office space, operators' wages and trunk equipment. The cost of the three factors last named should weigh heavily in establishing the grade of service to be maintained in a given locality. Unfortunately, the determination is complicated by the fact that in those places where cost of real estate, trunk equipment and wages are highest, the demands for service of high grade are most imperative, but nevertheless, an adjustment should be reached in each case between the cost and the quality of the switching service. The engineer fails to exercise his function when he accepts unreservedly, standards of performance which are established under unknown conditions in other places.

In the title of this paper I have referred to "standard appliances," in deference to current usage. Telephonic appliances are not "standardized" in the sense of being adapted or associated with standards of performance. Proposals to standardize appliances now being generally agitated, are rather to reduce telephonic appliances to a few types for uniform application.

The important considerations tending toward so-called standardizing of appliances are, reduced cost of manufacture, reduced quantity of stocks, increased promptness of supply and universal knowledge of uses and maintenances. These considerations are to be weighed against several important disadvantages to which I shall refer later.

The most energetic promoter of standardizing appliances ordinarily, is the manufacturer, whose interest it is to reduce costs by increasing the quantity of his uniform product. Frequently, however, the reduction of cost effected by standardizing, fails to manifest itself in reduced price to the consumer. In such a case the standardizing of appliances falls short of the possible advantages. It is a matter of

common experience that the making of a few special appliances is very costly; the making of a moderate number may approach the minimum possible cost; toward the minimum no great advance will be made with further increase of quantity of uniform product. This consideration indicates that special and unusual appliances in small numbers should be avoided whenever possible, excepting for definite experiments, or important special uses; that a variety of standard appliances used in considerable numbers may be preserved; and that a single type of appliance should be adopted for universal use only when upon careful study it is determined that an adequate grade of service can be attained by its use in nearly all cases.

In these times of extraordinary rapid development in the telephone business, promptness of supply from stock or manufacturer is an important consideration. Such promptness of supply can be attained only if the variety of appliances be strictly limited. The consideration may be a temporary one, however, and its weight often can be reduced by fore-knowledge and planning.

The advantages arising from familiarity with telephonic appliances appear both in relation to the public users and to the operating forces of the company. The public is strikingly incompetent in the operation of mechanism. Mere unfamiliarity with the telephone greatly retarded the spread of its use; the same cause operates against it with respect to any change, even a trifling one, which affects the mode of using it. The addition of a button to push during ringing, the substitution of an automatic for a magneto call, the requirement that a subscriber give his order twice instead of once, or give his order in a particular sequence, involve long and patient education; the education of all users is never accomplished and the system labors under a continual burden of inaccuracy and frequent neglect to employ it when it would be successfuly used, if it were familiar. We have no measure of the benefits in increased business and accuracy of service which would arise from uniform apparatus, but no doubt exists that substantial departures from uniformity are seriously harmful. It is to be noted that this consideration affects mainly outward appearances and modes of handling appliances, not their details of structure.

The efficiency of the operating companies' employes is largely dependent upon their familiarity with the structures. I refer not so much to the operators as to the construction, inspection and maintenance forces. The existence in a single exchange of a variety of appliances for the same general purposes very greatly increases the burden of educating these forces for their work; and during the process which is never completed, faults in the structure are continually produced or permitted because of unfamiliarity with the less common appliances. It is a familiar fact, that a lack of uniformity in the sections of the multiple board, by hampering the shifting about of the operators, may seriously impair the efficiency of the force. In constructing or maintaining the plant, mere differences in the arrangement of terminals and colors of wire insulations result in defects in performance which are costly to locate and eliminate. So simple a deviation from common practice as requiring that the telephones be poled in the circuit has resulted in serious deficiencies of transmission in a large number of instruments. In ordinary mechanism lack of interchangeability of parts results in the obvious failure of the parts to fit in place. In the telephone industry the misfits usually are not apparent; they are left to work their insidious evils unobserved.

The disadvantages of standardizing appliances are somewhat more general in their nature than the advantages. Possibly the most important of these is that standardizing prevents the natural selections which operate where a variety of forms are present to bring the fittest to the fore. Purchasing agents and telephone engineers do not proceed like the forces of nature in their selection of the best types; their knowledge of facts is always inadequate, their compromises are not always wise, and their selections are not adjusted continually to changing conditions. Possibly the most striking example just now of the insufficiency of the engineer's best efforts at foresight, is found in the unexpected and enormous spread of telephones, which compels the early abandonment of exchange equipments planned for long lives. Other examples are the persistent refusals, first on the part of the Bell companies and later on the part of the Independent companies, to adopt party lines. Even the provision of a central battery in the exchange, now accepted as the obvious and only rational construction, was strongly opposed by competent engineers. The distrust of automatic mechanism and the opinion which appears to be current that automatic trunking and automatic distribution of calls are unprofitable, may in time prove to be unfounded.

The only substitute for natural selection of the best, from types naturally competing, is an exhaustive study and unprejudiced judgment of all structures which promise improvement or economy in any direction. Such research can be conducted only with great resources, and even then it calls for rare foresight and persistence. From these considerations it might seem that standardizing of appliances was safe and even necessary for an operating company with an established business, but undesirable for a newcomer compelled to make his way on a showing of good reason for his existence.

A related disadvantage of standardizing appliances appears in the inertia of ideas and of plant, which result from limiting the types of appliances. The public, familiar with the use of only one form of instrument, may decline to use a different though better one; construction and maintenance force familiar with one form will oppose, malign or even destroy strange appliances. It is a truism in telephony that the opinion of an operator cannot be accepted as to the deficiencies of familiar apparatus or the advantage of new apparatus.

The conservatisms of the public and of operatives can be overcome by education, however; the most serious inertia is that of the capitalist. Where a variety of appliances are used it is not difficult to show economies of one over the other; the results of their competing performances are manifest; and when the competing appliances are rivals it becomes a matter of life and death on the part of the owner of the less efficient to find a better machine. If only one type of appliance is under observation, the basis for adequate study is lacking; the advantages of improved apparatus are not apparent; decrease of profit is not so directly traceable to the need for an improved mechanism, and the motive for prompt replacement is lacking. Even though it be possible to show a theoretical saving in annual charge in favor of improved appliances, there will be no haste to make the change.

In determining upon standard appliances much, and often undue, weight is given to the prevailing usage. Such usage sometimes will be found justified by the fact that the appliance is the survivor of many; but not rarely its wide use rests only upon conservatism or inertia. In examining the reason for existence of such a usage, a study of its origin often will be enlightening. The conditions which produced it may be found to have disappeared or diminished in importance; or, as in a number of cases which might be named, mere thoughtlessness may have been responsible for its extensive use. An interesting example is the tubular drop, designed as a bridged clearing-out drop, but used almost universally as a line drop cut-off during conversation. The costly construction was necessary for its limited use in the permanent bridge of the circuit; but it was needless in the more common use as a line drop. Similarly

the bridging magneto was designed for multi-station lines; but its use became almost universal for lines where its costly winding of fine wire was unnecessary. Even now the sales of bridging bells are mainly of the costly sort adapted for extremely severe conditions of service, which only a small percentage of them are required to meet.

In so far as it is possible the selection of standard appliances should be based upon costs rather than prices. Prices of new and highly efficient or patented appliances are likely to have no fixed relation to costs. Thus, the adjustment of quality, to costs of performance, may be entirely vitiated by unexpected and arbitrary changes in price.

While it is desirable that telephone systems in their present condition of partial development should be left reasonably free to improvement, the engineer should be on his guard against waiting for new developments. The structure produced to-day will develop faults to-morrow of a sort peculiar to itself. Existing and tried structures, perhaps with some trifling improvements, the effects of which are certain, should ordinarily be preferred to promising new ones.

One point remains to speak of, which is important and not always tolerable factor affecting the uniformity of method and appliances in the telephone industry. This is personal interest. On the part of the manufacturer it appears in reluctance to modify his product, or to abandon an obsolete type. On the part of the engineer it often appears in his adherence to appliances of his own design. The inventor is notoriously a poor judge of his inventions. It is nearly always possible to make an appliance different and in the absence of adequate data to advance claims of improvement. The best example of telephone engineering practice in existence, which is also an example of the closest adherence to standard methods and appliances, has been achieved almost wholly without invention on the part of the engineers who created the system. Their work has been confined to inspiring others to invent, and selecting the most desirable from the product.

MAINE TELEPHONE ASSOCIATION.

At the annual meeting of the Maine Independent Telephone Company, held in Lewiston, an organization was perfected with the following officers: W. H. Park, of Portland, president; M. L. Davis, of Portland, secretary, and Elmer E. Daicey, of Auburn, treasurer. An executive committee of five members was appointed consisting of F. E. Burkett of Union, W. R. Dresser of Houghton, W. H. Lurvey of West Paris, F. L. Ames of Norridgewock, and W. H. Park of Portland. A constitution and by-laws were adopted and the association voted to affiliate itself with the International Independent Telephone Association of America. The next meeting will be held in Portland, Sept. 12.

PENNSYLVANIA CONVENTION.

The third annual convention of the Pennsylvania State Independent Telephone Association will be held in Allentown, Pa., on September 11 and 12, 1906. The committee in charge is working hard to make this convention the most enthusiastic and successful ever held by the association, being assisted in this work by the members all over the state.

The Pennsylvania association has always made an excellent showing, not only at its home conventions, but at the national conventions. At the last national convention held in Chicago last June, Pennsylvania had a larger representation than any one state, and was represented upon every important committee.

A Pennsylvania delegate was elected treasurer of the national association, and it was a Pennsylvania company that secured first prize in the photographic contest for the best exchange and equipment.

As Allentown, Pa., is but a two-hours' ride from New York City, it is expected that several representatives of the city of New York will be present at this convention, to obtain information regarding the Independent movement, to be used in connection with the application for an Independent franchise in New York City.

Every Independent telephone man in the United States is urged to attend this convention and it is hoped that many new faces will be found among those present at Allentown, Pa., September 11 and 12.

A PROGRESSIVE NEW HAMPSHIRE COMPANY.

People's Telephone Company of New Hampshire was organized early in February, 1906, immediately acquiring all the telephone properties of George B. Shaw, including Shaw's Hampton Falls line; also a majority of the stock of the Exeter & Kingston Telephone Company, operating a telephone line to Little River in Kingston. In addition the company is just completing an entirely new telephone plant in Exeter, which is fitted throughout with all the most modern equipment, including aerial cable in the town limits, central energy switchboard in its new exchange, new instruments, etc., thereby making it the most up-to-date telephone plant of its size in New England to-day. Outside of the town limits a new line has been built to Kensington. In addition the company is now extending its Hampton Falls line into Hampton.

Franchises having been secured in Hampton, North Hampton and Rye, the company is extending its lines into all of these town as fast as possible, the ultimate object being to enter Portsmouth as soon as the necessary franchises in that city can be acquired.

The company began business with an initial capital of $5,000, which was all taken by the directors and by private subscription. The plant complete will cost about $10,000, and in order to provide the necessary additional cash capital to cover this excess over initial capital, also to provide the necessary cash for the extension of its lines as above outlined, it was recently voted to increase its capital to $15,000.

MOUNTAIN TELEPHONE LINES.

Like Mahomet, the telephone has gone to the mountain, as the mountain could not come to the telephone. A long-distance line has been built to the summit of Mt. Washington, in New Hampshire, and was formally opened Aug. 3. From the top of the peak persons now can talk to all points in New England.

Announcement is made that a telephone line has just been completed in Greylock mountain, near Adams, Mass. The wires are strung on poles to the base of the mountain, and then are run through an inch steel pipe which is strapped to the solid rock in the center of the big landslide that occurred in 1901. The steel straps are riveted to the rock, holes having been drilled for that purpose. There are 2,800 feet of wire in the pipe. At the top of the landslide the wire comes out of the pipe and is again strung on poles to the summit. Some of the poles are set six feet deep in the solid rock. In the pipe that carries the wire up the slide are hand holes 300 feet apart to permit repairs to be made. To ground wires in electrical storms, and prevent destruction by lightning and discharges in the central office at Adams, two poles at the base of the slide are set in eight feet of water, and about fifty feet of wire is coiled about to take the effects of the lightning should a bolt hit the line.

Persons ascending the mountain are warned against using the pipe in climbing, especially during thunder storms, when they might receive fatal shocks.

MANUFACTURERS DEPARTMENT

AUTOMATIC ELECTRIC'S NEW FACTORY.

The Automatic Electric Company has been obliged for the third time since its incorporation in 1901 to enlarge its plant to enable it to meet the increasing demand for automatic equipment, and is now erecting, on the property adjoining its present plant, southwest corner Van Buren and Morgan streets, Chicago, a duplicate of the building now in use to be joined to it by a smaller structure, the administration building, in which will be housed the company's offices. The new buildings, which will be completed and occupied by December of this year, will be of mill construction, brick, with a cream brick facing exactly similar to the present structure.

New Factory Building of the Automatic Electric Company.

The factory addition will be 85 feet front on Van Buren street, and 165 feet deep. It will be six stories high. The administration building will be 40 feet front and 40 feet deep, the same height as the factory buildings, but the first story will be omitted and the space underneath the second floor used for a driveway to the large court between the two factory buildings. This court will be 40 feet wide by 123 feet deep. Fire walls will separate the administration building from the factory buildings.

The entire frontage of the plant on Van Buren street will be 210 feet. The monotony of such an extensive frontage will be broken by recessing the administration building two feet from the line of the factory structures.

While the actual floor space of the plant will be a little more than doubled, by reason of a most economical arrangement of space, machinery and the routing of the product from start to finish of manufacture, the capacity of the plant will be trebled.

The enlarged plant will be supplied with all that is most modern and efficient in machinery and appliances for rapidity of manufacture, and the comfort and convenience of operatives.

The various manufacturing departments will be so arranged that the raw material will enter at one part of the plant and will take a direct route through, coming out as finished material at another point.

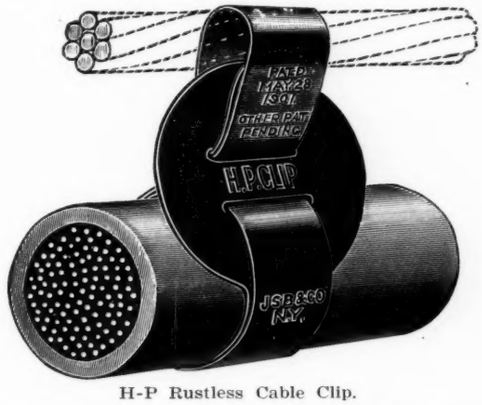
The completed plant will be one of the finest and best arranged factories in Chicago. The architect is W. Carbys Zimmerman and the contractors are Wells Brothers Company.

THE H-P RUSTLESS CABLE CLIP.

The H-P rustless cable clip, one of the most popular devices that have been introduced in the telephone field for some years, is enjoying one of the most prosperous sea-

sons in its history this summer. More than half a million had been shipped up to August 1 and it is said that they are everywhere giving satisfaction. As indicated by its name, the H-P rustless cable clip or hanger is devised for suspending telephone and telegraph cables. Its manufacturers, John Bassemir & Son, of New York City, describe the device as follows:

It is made of one piece of sheet zinc. There is, therefore,



H-P Rustless Cable Clip.

no danger of electrolytic action taking place between separate parts and there are no loose parts to become separated or lost. It is very simple and quickly applied. The hanger cannot jump off the suspension wire. It grips the cable tightly, and does not allow it to slip. It is strong and durable, will not rust and is one of the cheapest devices of the kind manufactured. Samples and prices will be promptly furnished on application.

THE GOULD STORAGE BATTERY COMPANY'S NEW OFFICE.

Owing to the growth of business with consequent demands for a closer base of operations, the Gould Storage Battery Company has found it necessary to establish a Canadian branch with offices at 62-64 Wellington street West, Toronto, Ontario. Mr. F. B. Yates has been placed in charge of this office. Besides the regular line of storage batteries for load regulation, in connection with a Gould Counter E. M. F. Booster, on street railway, lighting and power plant systems, and floating, or line, batteries, the Gould storage batteries are being manufactured for use in train lighting and also for telephone and telegraph work.

The Gould Storage Battery Company has a complete corps of competent engineers in its employ and will be glad to take the problem as to whether a storage battery would be of advantage under the existing conditions and to give expert advice on the same.

The company has now in press a new booklet on telephone batteries, which it will be pleased to send, without charge, to those interested.

NEW EXCHANGE EQUIPMENT FOR PORT ARTHUR, ONT.

At the time of installing the municipal telephone system at Port Arthur some three years ago it was estimated that ample provision had been made to take care of the increase in subscribers for many years to come, but the demands have so far exceeded expectations and the service has become so popular that it has been found necessary to install an equipment with an ultimate capacity which will admit of an almost unlimited growth. Accordingly on July 25 the matter was submitted to a vote of the ratepayers and a by-law was passed, with only twenty-three dissenting votes, authorizing the expenditure of $42,000 for a new exchange building and a full multiple central energy switchboard central office equipment.

When the bids for the equipment were opened on August 10, tenders had been received from three manufacturing companies.

The contract was unanimously awarded the International Telephone Manufacturing Company for a 4,800-line ultimate capacity, 1,200 lines equipped, lamp signal central energy multiple switchboard, using in the new installation the storage battery plant and power equipment of the present exchange. The installation will be similar to the one at Fort William, Ont., the contract for which was awarded the Internatoinal several months ago.

LARGE SHIPMENT OF GUY ANCHORS.

The shipment of a carload of Stombaugh anchors to Texas is indicative of many things. It shows that the Stombaugh guy anchor is well regarded in Texas, in spite of the heavy freight rates, and that the Hobson Electric Company is a progressive and up-to-date electrical supply firm which believes in keeping a good stock of the best of everything pertaining to the street railway, electric light and telephone field. Over three-quarters of the contents of this car are to be used by one telephone company. When one stops to consider that this car contained over $3,800 worth of five-inch and six-inch anchors, it is possible to realize the importance of this guy anchor in the construction field. The Stombaugh guy anchor patents were purchased by W. N. Matthews & Bro. in 1899. At this time the "dead-man" was the only known means of anchoring poles to the ground. W. N. Matthews & Bro. began to advertise the Stombaugh in 1900. They sold almost a thousand of them that year. The business increased rapidly in 1901, 1902 and 1903, due to judicious advertising in trade journals, coupled with the great merit and labor-saving features of the anchor. In 1904 the company had a very large business, and doubled it in 1905. More sales were made during the first six months of 1906 than the whole of 1905. In 1905 and 1906 patents were granted on several very important improve-

CONSIGNED TO
THE HOBSON ELECTRIC CO., DALLAS TEXAS.
LOADED WITH
STOMBAUGH GUY ANCHORS.
THEY ARE THE BEST FOR ANCHORING TELEPHONE AND STREET RAILWAY POLES.
MANUFACTURED BY W.N.MATTHEWS & BRO. 244 NORTH 2ND ST. ST.LOUIS,MO.

Carload Shipment of Stombaugh Guy Anchors.

ments embodied in the type B anchor. The company says that thirty-three substitutes for this anchor have appeared in the last five years, but have all died the death caused by the disease "inferiority." This company is the owner of the patents, and manufacture the following specialties: The Hargis splicing joint or sleeve for making quick, perfect and "get-at-able" joints in telephone and telegraph cable; the Callahan cable roller for putting up heavy aerial telephone and telegraph cable in the quickest, safest manner at the smallest cost; the Kearney cable clamp for doing away

with splices and saving waste on cable of from 3-0 up to 1,500,000 cm at corners and dead ends (not for telephone work), and the "Hold Fast Lamp Guard," which is guaranteed to protect incandescent lamps on drop circuits under any and all conditions.

THE SMITH MARLINE CABLE HANGER.

Great responsibility devolves upon the cable hanger in telephone service, making it essential that this article be of the highest quality and best workmanship. Both dependability and durability are claimed for the Smith Marline Cable Hanger, manufactured by Walpole, Johnson & Co., of 1461 Monadnock block, Chicago. While the Smith hanger maintains the standard shapes and sizes, it is claimed that it represents a new departure in the quality of material used and in the process of manufacture.

The marline and houseline used in the Smith hanger is the same as is used on sailing vessels, and, it is said, will last as long as the supporting strand. The use of inferior grade of marline in some hangers, which make possible a slightly lower price, results in the failure of the hanger within a few years.

The hooks of the Smith hanger are formed from the best grade of galvanized steel wire of a gauge allowing a factor of safety over normal demands of service.

The machines used for making the Smith hanger were especially designed for that purpose and have enabled it to reach the highest plane of excellence in workmanship.

Smith Marline Cable Hanger.

The marline knot, a weak feature in most hangers, is the principal point of excellence in the Smith hanger—the knot is drawn so tightly that it is claimed it cannot slip, and this without the least injury to the marline.

The hooks are carefully made, and are uniform in size and shape.

An added advantage claimed for the Smith hangers lies in the fact that they are put up in bunches of fifty, each bunch securely wrapped and plainly labeled. This accounts for their popularity among construction men, as it avoids loss of time through tangled bunches and confusion in sizes.

The Smith hanger has been on the market for three years, and has been used extensively by large contractors and cable manufacturers. It is represented by its manufacturers as a practically perfect hanger at an attractive price, and it is meeting with favor in the telephone trade. All orders and inquiries should be addressed to Walpole, Johnson & Co., Sole Manufacturers, 1461 Monadnock block, Chicago.

THE FLEUR DE LIS DRY BATTERIES.

The French Dry Battery Co., of Madison, Wis., has enjoyed a very prosperous season. On account of the firm's intimate relations with one of the leading French carbon makers its battery is styled the "Fleur de Lis," that being the French national flower. Mr. Alfred Landau, manager, informs TELEPHONY that the company's battery stands for the very highest quality in every respect. To keep his battery in front he states he will not only employ the finest materials, the most approved French process and the most skilled workmen, but will advertise his batteries extensively in the best mediums, making it to the jobber's advantage to carry a full line of the "Fleur de Lis" constantly in stock.

In addition to dry batteries, Mr. Landau will handle globular carbon of the finest quality. He asks that parties interested in such items correspond with him and get his proposition.

LOOKING FOR TROUBLE.

Sometimes it is impossible to locate trouble on a line without tearing open the wiped joints of the horizontal sleeves along your cable lines. This is an expensive and sometimes fruitless method. You also run the chance of causing more trouble and of spoiling your insulation. The accompanying photograph shows the ease with which pairs

Testing Cable by the Modern Hargis Method.

can be tested by the use of the Hargis splicing joint instead of the horizontal sleeve.

By simply unscrewing the lead pot (resting against the pole and messenger) you can get at and test all the pairs without disturbing a thing. If the trouble is not located here you replace the spot and go on to the next joint until you find it. The saving of time and expense is obvious.

The Hargis splicing joint or vertical sleeve is made in three sizes, Nos. 1, 2 and 3, which accommodates any cable up to 480 pair.

The manufacturers state that they can make immediate delivery of the No. 1 and No. 2 joints. The No. 1 accommodates cables of 100 pair or less. The No. 2 cables of 200 pair or less. W. N. Matthews & Bro., 226 North Second street, St. Louis, are the manufacturers.

A recent conference of the mine owners of Victoria and Tasmania, Australia, voted unanimously in favor of installing telephones in their mines as a safeguard against accidents.

TRADE NOTES.

McRoy Clay Works, Brazil, Ind., sends out its advertising blotter for August, containing "Casey's Revenge," which is the sequel to "Casey at the Bat," so familiar to baseball fans. The verses have a timely application during the ball season.

The North Penn Iron Company of Philadelphia, Pa., in its Bulletin 27, calls attention to its line construction material for telephone companies. The bulletin is illustrated and describes the company's full line of specialties. The bulletin may be had by addressing the company.

The Central Electric Company of Chicago is sending out to the trade its August price list applying to general catalogue No. 24. The prices quoted are the very latest in force and it is suggested that any one that has been overlooked in the distribution write the Central Electric Company for a copy.

A full line of security specialties, made by the F. Bissell Company, Toledo, O., will be found with the Electric Appliance Company in San Francisco and with the same company in New Orleans. These agencies are newly appointed and are in addition to the long line of distributors already handling this product.

The Columbia Electric Company, McCordsville, Ind., is arranging to remove its plant into a large factory, being built at Knighstown, Ind., within the next sixty days, where it will manufacture switchboards, plugs, telephones, electrical goods and automobiles, with a capital stock of $50,000 and a fully equipped shop.

In its latest catalogue the Illinois Electric Company (Chicago) lists the various tools, electrical supplies and fixtures and construction materials it supplies to the trade. Among the specials are Illinois pole steps, the Healy bracket, the Sandwich pole-changer, steel telephone signs, and the bulldog steel gain. Prospective buyers are requested to write for catalogues.

After September 1 the San Francisco representatives of the Gould Storage Battery Company will open permanent offices in the newly restored Monadnock building Previous to the earthquake and fire the Gould company had offices in the Crossley building, which was destroyed, while for the last four months temporary offices at 1701 Geray street have been occupied.

The Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., reports having closed contracts for switchboards at the following places: Palouse, Wash.; Georgetown, S. C.; Cumberland, Md.; Goldfield, Ia.; Provo, Utah; Morton, N. Y.; Parma, Idaho; North Adams, Mich; Indianapolis, Ind.; Moultrie, Ga.; Oakman, Ala.; Newtonville, Mass.; Clyde, Ohio; Logan, Utah; Rochester, N. Y.; New Castle, Ky.

The Standard Manufacturing Company, Bridgeport, Conn., has just contracted for a new three-story brick building 91 by 32 feet with a boiler house 24 by 20 feet. This building will be of modern mill construction throughout, equipped with elevator and fireproof vaults and will be located at the corner of Housatonic avenue and Fredericks street. After getting installed in its new plant the Standard Manufacturing Company will begin pushing vigorously its telephone and electrical apparatus and will employ about three times its present force.

Colman J. Mullin Company, Brooklyn, announces a new device for gripping wires and cables, known as the Gem wire clip, which is expected to appeal to telephone and power companies. It is especially adapted for pulling from 10 to 600 pair insulated lead-covered telephone cable, and it is said can be used to pull the heaviest type of power cable. Prices will be quoted on application.

The Berry Lightning Arrester is described in an attractive circular sent out by the Berry Electrical Manufacturing Company, of Marion, Ohio, entitled "Protection That Protects." The company asserts that the arresters will afford protection for instruments and cable pairs, in addition to which, it is pointed out, there are no fuses to replace or carbons to clean. Operators having trouble from lightning are invited to consult the manufacturers.

The Northwestern Telephone Company of Sandwich, Illinois, has recently installed an up-to-date Eureka Electric Company three position switchboard, 450 drops. The board was installed by one of the Eureka Electric Company's experts, the lines being cut over from the old board to the new one during one of the busiest periods of the day without disturbing the service in the least. The board is giving perfect satisfaction.

Century Telephone Construction Company, Buffalo, N. Y., report the closing of contracts on magneto switchboards for Cortland, N. Y.; Lodi, N. Y.; Belmont, N. Y.; Brookton, N. Y.; Berkshire, N. Y.; Orchard Park, N. Y.; Canaseraga, N. Y.; Lisle, N. Y.; Interlaken, N. Y.; Caywood, N. Y.; Russell, Pa. Also contracts for common battery switchboards for Cortland, N. Y.; Sonyea, N. Y.; Friendship, N. Y.; Hammondsport, N. Y.; Cornell, N. Y.; East Aurora, N. Y.; Paducah, N. Y.

Pedrick & Smith of Germantown, Philadelphia, Pa., manufacturers of the P. & S. pipe bending machine, have recently brought out the P. & S. structural steel screw capstan cable jack, a device especially designed for the laying of underground cable. Where large cable drums are employed, one is required for each side at a slight elevation from the ground. All companies interested in a device of this kind are invited to write Messrs. Pedrick & Smith, who will be able to supply descriptive matter regarding same.

Frank B. Cook has received a great number of orders for his protective apparatus of various sorts. Mr. Cook says that the largest part of his business consists of the protection for switch-board, pole cable terminals, and subscriber's station protectors. He has recently received orders for these various types from Granite City, Ill.; Kirkwood, Mo.; Clayton, Mo.; Lexington, Nebr.; Schoolcraft, Mich.; Boise City, Idaho; Seattle, Wash.; Seneca Falls, N. Y.; Delphi, Ind., and Akron, Ohio. He has also received from the war department through some of the switchboard manufacturers orders for 50 type L-3 frames, equipped with No. 8 protectors. For complete outside equipment or pole cable terminals, he has received, among others, orders from the following: Sussex, N. B.; El Paso, Texas.; Concordia, Kans.; Sullivan, Ill.; Franklin, Pa.; Charleston, Mo.; Marion, Ohio; Little Rock, Ark. For subscriber's station protectors (either type B-4 or type B-5) the fol-

lowing: Paris, Ill.; Quincy, Ill.; St. Louis, Mo.; Brockport, N. Y.; Atlanta, Ga.; Sussex, N. B.; Terre Haute, Ind. Mr. Cook says he has more business than he can handle on his universal guy clamps and on his self-welding wire joints.

AMONG THE COMPANIES that have recently contracted with the Swedish-American Telephone Company for their complete equipment are the Tyrone Local Telephone Company, Tyrone, Okla.; Farmers' Telephone Company, Kensington, Mo.; Armstrong Telephone Exchange, Ormsby, Minn.; Biggerstaff Telephone Company, Esstelline, Texas; Odel Telephone Company, Mapleton, Kans.; Farmers' Mutual Telephone Company, Barlow, N. D.; Norwich Telephone Exchange, Norwich, N. D.; Louise Telephone Company, Pilot Mound, Manitoba, Canada; Iberia Telephone Company, Iberia, Mo.; Co-op. Telephone Company, Diller, Nebr.; Erie Telephone Company, Ltd., Nelles Corner, Ontario, Canada.

THE WESCO SUPPLY COMPANY, of St. Louis, Mo., wishes to announce that its new General Electrical Catalogue No. 100 is now completed and is being distributed to those actively engaged in electrical work, either as contractors, dealers, engineers or operators of central stations. This is without doubt one of the most complete catalogues of its kind ever published, containing as it does complete descriptions with valuable data concerning all modern electrical goods, appliances, devices and specialties, together with much useful information of immense value to all electrical workers. All buyers of electrical goods are invited to send their names and address together with their occupation to the Wesco Supply Company for a copy of this catalogue, which will be sent promptly, express prepaid.

EVERY LARGE CITY on the Pacific coast from San Diego, California, to the northern boundary of the United States has now adopted the automatic telephone system of the Automatic Electric Company, the contract for the last large city—Spokane, Washington—having been signed recently between the Home Telephone Company of Spokane and the Automatic Electric Company. It calls for the building and installation of a 3,500-line automatic exchange of the most modern type, together with power appliances, telephones, etc. San Diego, Los Angeles, San Francisco and Oakland, California; Portland, Oregon; Walla Walla, Tacoma, Bellingham and Spokane, Washington, all having automatic installations, will be important factors in an extensive long-distance system being worked out on the coast by local capital.

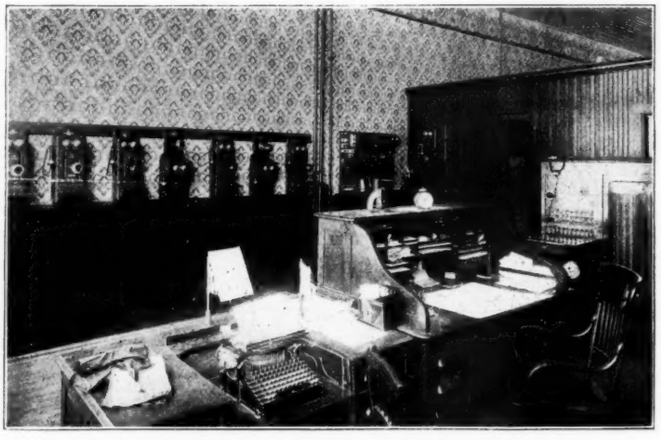
TWO HANDSOME BOOKLETS have been issued by the Automatic Electric Company, Chicago, containing complete data about its magneto telephones and magneto switchboards. The former is the first catalogue of magneto or generator-call telephones distributed by the company, and has, as a preface, an open letter to the trade which says that while a majority of its force will continue to be employed in manufacturing automatic systems it will develop a line of manual apparatus. This has been used in making up the wire chief's, trouble and information clerk's desks and the toll and farmer line switchboards installed in connection with its automatic exchanges. The Automatic Electric Company does not expect to make large manual switchboards, but only such a line described in its bulletins and which will meet the demands from rural districts and villages for small, simple hand-operated boards.

MR. W. F. HESSEL, Chicago, Ill., has assumed the position of general sales manager of the Stuart-Howland Company, Boston, Mass. Mr. Hessel has been associated with some of the largest companies of the country, and has earned a wide experience and broad acquaintance with those interested in the electrical field. His early experience in the practical operation of central stations has been particularly useful as applied to the advancement of the modern electrical supply business, with which he has been identified for the past ten years. During the last four years Mr. Hessel has been identified with electrical industries in the Middle West as sales manager of the Western Electric Company, manager of the Standard Electric Company, Cincinnati, Ohio; sales manager of Pass & Seymour, Incorporated; and prior to that time he was associated with Eastern interests. His many friends in the West will regret to learn that he has decided to make his headquarters permanently in the East.

THE W. R. GARTON COMPANY, 118 W. Jackson boulevard, Chicago, has just taken the agency controlling a large portion of the output of the Maine Hub & Manufacturing Company, of West Seboois, Me., for the electric insulator pin product. The Maine Hub & Manufacturing Company carry in stock at least a million pins at all times. These pins are made in winter-cut, black birch, one of the closest grained, strongest fibered and durable woods grown on the American continent. It is very long-lived, of high tensile strength, pleasing in appearance and cheapest in the long run. It is claimed to be better than locust in point of strength and durability. It is not readily attacked by rot or insects, and is one of the most serviceable lumbers to be found. Many vehicle manufacturers will use nothing else for hubs, because it has been found to be the most satisfactory. When used as insulator pins, it is the nearest approach of anything in wood to iron and metal.

SWEDISH-AMERICAN KANSAS CITY BRANCH.

An illustration is herewith presented of the interior of the branch warehouse and office of the Swedish-American Telephone Company at Kansas City, Mo., located at 115 West Sixth street. The Swedish-American Company established this branch about May 1 and since that time the growth of



Interior, Swedish American, Kansas City Branch.

business at that point has been rapid. The fact that orders are shipped on the same day they are received is a feature greatly appreciated by southwestern Independents, as evidenced by their patronage. Shipments from Kansas City at this time average about two car loads of instruments per week. The Swedish-American company is gratified with the results and predicts that the coming season will tax its capacity to fill orders. Since locating in its new factory, however, which it owns, the company is prepared to turn out large quantities of apparatus, and in this connection it is claimed that for completeness, up-to-date methods and appliances the Swedish-American factory is distinctly in the front rank. Branch offices have also been established by

this company at the following places: Fargo, N. Dak., 112 Broadway; Omaha, Neb., 615 Bee building, and Toledo, Ohio, 1024 Spitzer building, all of which are proving profitable and popular with customers.

A POPULAR SALES MANAGER.

For the sake of euphony, if for no better reason, Robert Miller's name should have been Robert Steel, or Robert Wire, if you please. Not necessarily because Mr. Miller is a slave to his business, for he isn't, but because his business conversation is very largely devoted to exploiting the products of his company and especially telephone wire. We have no knowledge concerning when Mr. Miller first engaged in the wire business, but it was four years ago when he appeared as the general sales manager for the Indiana Steel & Wire Company, Muncie, Indiana. That he is a popular and successful sales manager goes without

Mr. Robert Miller.

saying. His record with his company is most enviable and his present prestige with the trade has been established because of the painstaking educational sales campaign that he inaugurated in the beginning.

Mr. Miller's given name (Robert) is used only in the official city directory of Muncie, for everybody knows him as "Bob," and it is not necessary to have a formal introduction to address him thus. He is as popular in the telephone trade as is his company's product, which means they are both very satisfactory.

POLE CHANGERS AND DUPLEX SETS.

The Current Electric Company, Chicago, has enjoyed a very successful season, filling many orders from telephone managers for its Standard pole changer and Standard duplex set. The company guarantees satisfaction to all purchasers and immunity from patent litigation.

The entire mechanism of the Standard pole changer is built on the inside of a highly finished quarter-sawed oak case with the binding posts and switchboard on the outside. To observe the interior one has simply to turn it over; there is no glass to remove or get broken. It will work in all positions. Dimensions are 6x8x4 inches; weight 3½ pounds.

It is claimed by the manufacturer to be economical and convenient, as it takes but one battery to operate it. Its present price is but $15.00, and it will be sent on thirty days' trial to all responsible parties.

The other telephone specially manufactured by the Current Electric Company is the Standard duplex set.

Standard duplex sets are made for, and extensively used on metallic bridging lines, metallic toll lines, trunking lines, etc., as they render one or more additional talking and ringing circuits, according to the original number of circuits and the number of instruments used, without cross-talk or disturbance to the original lines. The company claims that they are simple, inexpensive, easy to connect, have no movable parts or contacts to wear out or get out of order and are well protected by lightning arresters.

OFFICIAL BULLETIN NO. 2.

The International Independent Telephone Association of America in its Official Bulletin No. 2, second series, announces that its general offices have been moved from rooms formerly occupied to 422 Electric building, Cleveland, and invites Independent telephone men to call when visiting Cleveland.

The amendment to the constitution adopted at the last Convention reduced the size of the executive committee with a view to making it a very active body. The new committee was assigned certain detailed work that was formerly handled by a separate committee. The President has appointed to act as this executive committee: C. W. Kline, Hazelton, Pennsylvania; Frank L. Beam, Columbus, Ohio; A. C. Lindemuth, Richmond, Indiana; and M. B. Overly, Louisville, Kentucky. All of the members are within easy traveling distance of headquarters, enabling the president to call meetings on short notice whenever it is deemed necessary. As provided by the constitution, all of the members of this committee are presidents of their various states' associations. The constitution provides that the president shall be an ex-officio member and chairman of the committee.

In appointing the committee on litigation and legislation, care has been taken to select members from states not already represented among the officers or executive committee, and to have the membership as widely distributed as possible. This committee is composed of the following: J. B. Earle, chairman, Waco, Tex.; F. H. Woods, Lincoln, Neb.; E. R. Conklin, Aurora, Ill.; E. B. Fisher, Grand Rapids, Mich.; and Richard Valentine, Janesville, Wis. In selecting this committee, it was aimed to be representative and to have it act in addition to its special duties with the officers and executive committee in perfecting the organization in various parts of the country.

The good effect of the last convention continues to be noticeable in the increased interest being taken in organization all over the country. Both North Carolina and Maine have formed Independent associations during the last month, and both will affiliate with the International association.

It is announced that the official report of the proceedings is in the hands of the printer and will shortly be ready for distribution.

The telephone line between Paris, Lyons and Rome was opened for business July 1. At first the public will be able to make use of the system only at the exchanges, but eventually the service will be extended to all telephone subscribers in those cities and intermediate points.

CONVENTION PAPERS

EXPERIENCES OF THE TRAFFIC MANAGER.

THE experiences of the traffic manager are numerous, especially so as regards the working of the long-distance lines, and the operating of the same.

There is nothing that interferes with the long-distance service as much as poor maintenance. As nearly all of our toll lines are now copper, I shall refer to copper lines principally.

A man is sent on a case of trouble, he finds the line down or opens a line for test, which is usually done at a transposition; closing the line he will put in a straight wire joint by giving it a few twists around the line wire or, as in one case which I found recently, the wire was too short to make a sleeve or straight wire joint so that the troubleman made a common twisted or pigtail joint. In another case the wire was too short and the troubleman, instead of putting in a new transposition, used a No. 20 office wire to jump across the line, making a very poor contact. (Possibly saying to himself, "Well, I will fix this up the first time I come out this way again," but that time never comes.)

This kind of work will do for a time, but as a copper wire corrodes very rapidly, the joints become dirty and the first thing you know the line becomes noisy and the service necessarily becomes poor, causing dissatisfaction to the subscribers and also making inevitable a great deal of abuse to the operator.

This lax method of doing business does not end there; the trouble will be located between certain stations; a troubleman drives to the next town looking for something on the wire. This reminds me of an actual experience which occurred some years ago. The troubleman at Mt. Clemens was sent to Algonac on local trouble, while in the Algonac office he was told that a certain toll line was out of order between Mt. Clemens and Port Huron. He had just finished making his test, locating the trouble between Algonac and Port Huron, when the troubleman from Port Huron stepped in. The troubleman from Mt. Clemens asked the Port Huron man what he was on; the Port Huron man telling him the line; which happened to be the same line that he had just tested; told him the trouble was between Algonac and Port Huron. The Port Huron man said, "No, it isn't, but the trouble must be between Algonac and Mt. Clemens." Now the troubleman from Mt. Clemens was a good, conscientious man and thoroughly reliable, and during the conversation the Mt. Clemens man asked the Port Huron man what position the line took. The Port Huron man said, "Why, I don't know." Managers, I am led to believe that a great many of our toll line repairmen go out on a case of trouble with the same vague idea that the Port Huron man had; they are looking for something. What?

But to get back to our original proposition, the troubleman drives to the next town looking for something on the wire; he finds the line clear of any obstructions and possibly finds the line clear when he makes a test; this happens two and possibly three times before the trouble is finally located and repaired, thereby adding an unnecessary expense; when all this trouble and annoyance could have been avoided if the troubleman had taken the proper and necessary pains to do the work as it should have been done in the first place.

It is essential that all toll line trouble should have precedence over all local trouble. All toll lines should be tested by the operator not later than 7 a. m. and any detected trouble reported to chief operator or manager.

I wish to say right here: it is not necessary to open any line for a test on either an open or a grounded line, and very seldom on a short circuit, as there are always enough test stations along the lines to make tests from.

If you are on an open or grounded line and you feel as though you wanted to make a test, call your home station or the station that is on the line which is in trouble, by means of another line, and tell them to listen while you put on a short circuit. If you have passed the trouble your line will be noisy, if not the line will be quiet.

In putting on a short circuit do not use your connectors, as they are not reliable; use a piece of office wire on a bright spot and twist the joint up good and tight to prevent any possible chance of escape; unless this is done you may get a false test and will be told to go the wrong way.

When a trouble man starts out on any trouble he should be properly equipped to remedy any trouble that may come to his observation and not be obliged to make temporary jobs with the expectation of fixing same up properly at some time in the future; but if such should be the case a report should be made to the manager and the temporary job made permanent at the first opportunity. A troubleman should always report to his manager or chief as soon as the trouble has been repaired.

Now just a word about the operating department. I am going to refer to the "code" first; too little attention is being paid to same; if the managers would give this matter a little time and see that the operators have a copy before them to study and learn the use of, I think the unnecessary talking now going on would be largely eliminated. This is not a hardship and does not add any extra work to the operator, but on the other hand lightens the work and facilitates a better understanding of what is wanted.

The line operators must report to the subscribers upon receiving a definite report on a call and such other reports as may be necessary. Operators should be careful not to call subscribers to the telephone to transmit to them indefinite reports, such as "no circuit," "line busy," etc.

Line operators should report to the chief operator all calls on which there has been a delay of twenty minutes or more and on which no definite report has been received from the distant station; she should also make the proper notation on the back of the ticket with the time the reports have been given.

Operators should also be instructed to report to their chief operator or manager all lines out of order, and lines that "don't answer" after three or four attempts have been made to get same.

The chief operator should take up all calls where at least three attempts have been made to get a busy line. One of the greatest evils at present is the holding of the toll lines by operators; they should not be longer than five minutes at the very longest. I might say incidentally that lines are being held by operators for their own use, which should never be allowed; this causes a congestion of the circuits and holds up the service that people are paying for. Another evil is the routing of "through" messages. Operators should be instructed when they have a call for which switching must be performed to give the answering operator the name of the station wanted; they should not try to build up the circuit themselves, for oftentimes the answering operator can route a call a much shorter and quicker way. I call to mind a call from Belding to Grand Ledge; the line from Belding to Ionia, the natural routing being busy, the operator called Grand Rapids and asked for Lansing; had she asked for Grand Ledge, the station wanted, the operator at Grand Rapids could have called Grand Ledge direct without going to Lansing at all, thereby saving at least one circuit and doing away with one extra switch and a possible chance for a cut-off.

The study of lost calls is a very important feature of the service and should be given special attention at every office. It is often found that calls are canceled on account of poor operating and line troubles as above mentioned. If proper steps are taken to remedy these conditions the percentage of lost calls will be materially decreased; not only this, but it will give the subscribers better satisfaction and will bring in a substantial increase in revenue. All calls not completed by midnight are lost for that day's business; however, these calls should be taken up by the chief operator the following morning and every effort made to complete any she may think there is a chance of reviving. A great many calls are saved in this manner; in the Grand Rapids office from one to five calls are revived daily, and some as far back as four days. The method we employ in keeping track of the calls where the parties are out for three or four days is as follows: We have a small box, about three by five and one-half by three inches; with index cards marked Monday to Sunday. The chief operator in looking over the lost calls finds one where the party wanted will be out for two or three days; she makes a duplicate ticket and files same in its respective place. Each day the index card is moved back and the tickets needing attention will be in front of her. Do this day after day and you will be surprised to find the number of calls that are revived which otherwise would be lost; this action should be taken on "received" calls as well.

A great many operators take a great deal of authority upon themselves by canceling calls not sanctioned by the subscriber; this is especially true when they get a report such as "I will call again" or "never mind." In five out of every ten cases if you keep after the operator on such calls and get the party wanted, your party who has said "we will call again" will talk and you will have a completed ticket instead of a canceled one.

One more thing which I wish to emphasize before closing is that operators are very careless on through lines; they do not listen in before they ring and in many cases they cut in on one side or the other, not attempting to use the center or listening jack. This should be given attention.—*Paper read by G. F. Stratemeyer before the meeting of the Citizens' Telephone Company's Managers at Grand Rapids.*

VALUE OF DISCIPLINE IN CENTRAL OFFICE MANAGEMENT.

No one can doubt the fact that the telephone exchange, as we find it to-day, is one of the most important business factors in this progressive age; and a well-governed operating force is more important to good service than the equipment. What I wish to have understood by this is that it is possible to give good, efficient service without the latest improved switchboard.

An important thing in making a choice for your operating force is to get girls who have had good home training. A girl that has had the proper government at home is better than one with a diploma from your high schools with the home training neglected.

What treatment should an operator entering the service receive, or expect to receive, from the chief operator or manager? Before entering upon her duties she should be given to understand just what is to be expected of her; go over the rules and try to impress on her mind that they must be lived up to; also have an understanding that when she goes into the operating room it is simply for a trial; she may not like the work, and it is possiblee that she will never make good; if she does not, it is only fair to her and yourself to tell her so. Do not keep her until she has caused your service to run down, just because some of your friends have recommended her. When she enters the operating room place her at a switchboard with the best operator you have for giving instructions; keep her in this position, watching her progress, until you are satisfied that she can handle the work herself or that she will not be able to do the work.

Do not keep nagging or picking at an operator; if you cannot get the proper results, after talking with her once or twice, let her go, as you and she will never be able to give good service if you do not have proper respect for each other. Do not judge a girl from the clothes she wears, the color of her hair, or the church she attends. Do not take a girl into your office that you would not have your sister or daughter associate with. Do not lay all your troubles to the equipment, but see at all times that it is in the best possible condition for giving good service. Test your cords daily.

The manager, while at all times the head of the exchange, should have able, willing assistants; and their hearty co-operation is essential to the proper operation and maintenance of the plant. Frequent and regular consultations should be held about plans and suggestions looking toward the betterment of the service.

Friction among the employes should not be tolerated, and petty jealousies which frequently appear should be promptly smothered. No partiality should be shown, but I have found that an operator or other employe who constantly endeavors to make himself or herself agreeable to everybody, and who advances the company's interests, should be highly commended. The finest system in the world, the most up-to-date switchboard, the most modern instruments, and all that goes to make up an exchange, amount to nothing if the operating force is out of harmony.

The manager should keep himself posted in his business through the press by reading all daily and weekly papers at hand, attend council meeting, meetings of the business men, and show an interest in the town or city in which he lives.

I wish to say one word in regard to soliciting: When you go to see a person do not start in to tell him the faults of the Bell company; if it is agreeable to him to talk about them he will give you an opportunity, which will give you a better chance to present your side and impress him with what you have to say. Do not load yourself up with clerical work so that you cannot get out and attend to your other duties. The manager should always have his whereabouts known at the office so that if a call should come in for him the person calling can be given an intelligent answer as to his whereabouts and what time he is expected to return.—*Paper read by A. A. Burch before the meeting of the Citizens' Telephone Company's Managers at Grand Rapids.*

THE IMPORTANCE OF KNOWING YOUR SUBSCRIBERS.

In writing a paper upon this topic I deem it necessary to outline briefly the reason for the birth of the Independent movement, and the sentiment of feeling between the public and Independent telephone men at large, as it is closely allied to same. My observation in different towns through mingling with all kinds of people, where the Independent and Bell companies are both in the field, leaves an indelible impression on my mind that the Independents are closer to the people, and the public seem to feel that we are one of them instead of looking upon us as if we were a wolf in disguise waiting for a chance to bite, and it will be to our interest to maintain this feeling, and one of the best ways to this end is to know your subscribers.

It is of vital importance that managers should become personally acquainted with their subscribers, especially in medium and small sized towns where most of the people are acquainted with one another; for instance, supposing that one of your subscribers, a Mr. Jones, has trouble with his telephone service (which, by the way, would not be a telephone system without some trouble, and that is the part of the business we want to know about; not the good service; and my experience has been not to try and avoid those of your subscribers who have trouble with their service, but to look them up and become personally acquainted with them; it will make it easier for you and better for your exchange. The trouble may be with one of your operators, or one of a number of various other reasons); he, Mr. Jones, being personally acquainted with the manager, will think twice before he will commence to run down the exchange and the service; but as I said before, being personally acquainted with the manager, in ninety-nine cases out of a hundred he will make the trouble known to him, and the manager will adjust same, thus avoiding unnecessary harm to the exchange. On the other hand, if this particular subscriber had never met the manager, ten to one he or she would not look him up, at least not before considerable harm had been occasioned in the way of running down the service.

Be honest, frank, and square in all your dealings with your subscribers and never tell them anything you are not in a position to substantiate, or promise anything you cannot give or fulfill, and in the course of a short time you will win their confidence, which means success to any business.

Not only is it important to know your subscribers in case of trouble, but it will be a great benefit in increasing the size of your exchange. For instance; you have a subscriber whom you know well; he hears of someone who has just moved into town and thinks they want a telephone but does not know which, Independent or Bell; the early bird catches the worm and through his "tip" you are the early bird. Or possibly his neighbors are using his telephone more than they should and he says to the manager, "Can't you approach them about taking a telephone without implicating me?" which will frequently result in a new subscriber. Or it may be that one of his neighbors has a Bell telephone and is not satisfied; he gives you a pointer, and the result may be another new subscriber. All these things are brought about by knowing your subscribers, and if you do not know them you will never be able to realize what you are missing, but may be wondering how it is the other fellow is increasing his plant and gets along with so little trouble.

Another reason for knowing your subscribers, and not by any means the least important one, is with regard to your collections. For instance, Mr. Jones is in arrears with his account and you meet Mr. Brown, who lives in his neighborhood; you ask him in a casual way about Mr. Jones, and he may tell you that Mr. Jones is going to move out of town the next week and a little hustle on the part of the collection department may save a petty ledger account.

When we got out our last directories I took advantage of the situation by distributing personally all the business and down-town directories; in this way I got a lot of valuable information and had an excuse for calling on the subscribers; and I found out there were a great many things pertaining to the service that I would not have heard of other than in this way.

I venture to say that all the managers present have had innumerable minor things called to their attention by their subscribers which are ofttimes rather puzzling, but my experience has been, and I think you will agree with me, that by knowing your subscribers petty matters pertaining to the exchange can be adjusted in less time and with better results to the management, as it puts the manager in a better position to act on any special case that may come up. I remember a short time ago one of our subscribers, a doctor, called me up and said his telephone had been troubling him about getting central; he had reported the matter several times, and the troubleman went down there and went over the line, but always found everything O. K. I talked it over with the doctor and we arranged the matter so that he should call me up at any time, night or day, from the nearest telephone the first time the trouble came on again. It so happened that one evening two or three days after that I received a call from him telling me his telephone was in trouble again. I went right down there and found the instrument dead on taking down the receiver. The peculiar part of the trouble was that the doctor's wife was the one that had all the trouble about getting central, and when I asked her what she did to the telephone when she used it she said, "Nothing; only I have to pull that thing down (meaning the transmitter) to talk," as I am so much shorter than the doctor; and there was where the trouble was; the fine wire inside the transmitter cord running through the frame had become broken and when the doctor's wife pulled the transmitter down she opened the circuit, but the doctor being taller would raise it up again, shutting the broken ends together and closing the talking circuit.

My experience has been that a simple thing like that will make considerable trouble unless attended to, and the best way to get along with trouble of that nature is to personally know your subscribers, and as I said before, your subscribers will do for you what they would hesitate to do if you were not personally acquainted with them.—*Paper read by H. H. Taylor before the meeting of the Citizens' Telephone Company's Managers at Grand Rapids.*

THE RURAL SUBSCRIBER.

Through the effort, energy and enterprise of the Independent telephone companies of this country it has been made possible for those of our rural friends who would improve the opportunity to become subscribers to a telephone exchange. The Bell (I am now speaking of my own locality) absolutely refused to give them any consideration whatever. Our people saw the great injustice in this and proceeded to construct rural lines with wonderful success and patronage, and I trust the business has been a fairly paying investment.

The great benefits that have been derived by the rural subscriber can scarcely be calculated; living miles from a village, from his doctor, his relatives, his friends; often a mile to his nearest neighbor; in lonesome and isolated homes, the telephone has placed

him in direct communication with his dealer, doctor, neighbor, relatives and friends, and made his long and isolated home bright and cheerful. In addition to this it has enhanced the value of his property, placed him in a position to take advantage of any advance in the market, in disposing of his products, and enables him to make the purchases over a telephone, thereby saving time and money.

There is no industry which is more dependent for success upon the earliest knowledge of weather changes than that of the agriculturist, and by becoming a rural subscriber he gets the daily weather forecast, as issued by the government, which report often enables him to make a saving from frost and other weather conditions; and this, of course, is very valuable to the farmer. All of these things, and many others I might mention, we take the credit for with pride and satisfaction, and I firmly believe that they are appreciated fully by the rural subscriber; for after he once becomes a user of a telephone, and finds out the benefits, advantages, and comforts it affords, and profits earned, he rarely orders his service discontinued.

In driving through the country one finds many beautiful rural homes, and one also finds many that are located away back in desolate and lonesome places. One would naturally think that a company of men with enterprise enough to construct a telpehone line to connect with some good exchange would find no difficulty in securing a contract from every resident that could afford a telephone, but he would be greatly mistaken. One would find that he would be obliged to use all the arguments that he possessed and then oftentimes would fail to secure them.

I once heard a paper read at a meeting of the Michigan Independent Telephone Association in which a statement was made that the person preparing the paper believed the proper way to build farm lines was to do no soliciting, just count up the houses in the district where you are to build and figure on at least ninety per cent; and then get busy. In my opinion we would have to keep busy a good long time in order to secure this percentage. The older farmer, who has lived on the same farm for thirty or perhaps forty years; cleared up his farm; has built good buildings, has some money at interest and has accumulated this by hard work and the practice of economy, who has never used a telephone and thinks he never will; knows he doesn't need it; has always got along without it and prospered fairly well; has his mail delivered at his door daily; considers a telephone a luxury. But the young, up-to-date, progressive farmer realizes the benefits and advantages of a telephone and is anxious to become a subscriber; he does not consider it a luxury but an actual necessity, and you have no truoble in securing his contract; but it often happens on this same line are two or three of the first mentioned class and not enough of the latter to make it profitable for the company to build.

But those of us who have had the experience of building a telephone exchange, starting without any subscribers; when our friends, the enemy, were the whole works; can fully and truly appreciate a contract for a rural subscriber.

In all farming communities the rural subscriber has influence, many times it is his hard earned money that is doing business in the town, and when you have secured his contract for a telephone you have more than half secured another one in town.

We have at the present time in our exchange at Portland 580 telephones classified as follows: Business, 84; residence, 261; farmers', 235. We consider we have been quite busy for the past three years, still we have not yet secured ninety per cent of the farmers in our district.

We realize, however, that we could not have accomplished this result without the assistance and co-operation of the rural subscriber.

From the operating standpoint rural subscribers on party lines as a rule are satisfied with the service they get. It is quite necessary to limit the time of conversation, and in our exchange we place this limit at five minutes. We also give toll line call the preference, as well as calls for a physician or veterinary.

The rural subscriber's instrument trouble is always "batteries." If the line is short or open, if his bell does not ring, if he is unable to get central or if he doesn't hear the party well with whom he is talking, he will lose no time in reporting that his telephone needs new batteries; and we always make it a point to get his "batteries" fixed as soon as possible.

The rural subscriber, as a whole, will average well with the rest of the subscribers; and with all their faults we love them still.—*Paper read by F. L. Francis before the meeting of Citizens' Telephone Company's Managers at Grand Rapids.*

THE TELEPHONE GIRL.

The old and oft-repeated statement that woman's intuition frequently beats man's judgment is proven true by our every-day experience: Intuition takes less time than reason and the rapidity with which a woman acts has proven a most desirable thing many times when there has been a crisis in the life of man or the history of a nation.

Whatever may be her position in other avocations of life, she is without doubt no unimportant factor in one of the world's greatest industrial institutions, the one that deals in the transmission of articulate speech. Neither her importance nor her value has been appreciated by those who use the telephone. Nor do I believe that she has been fairly treated. Doubtless because she is a telephone girl.

I have frequently said that a telephone is like a snake. Now a little garter snake is as harmless as a kitten, but everyone sees one wants to take a club and kill it. So it is with the average man with a telephone. And there is no one so unreasonable as the business man. If I go into my grocery store on Saturday night when every clerk is on the jump, and yell that I have an important social or business engagement and demand that the clerk leave the customer he is waiting upon and attend to my wants because my business is almighty important, the proprietor tells his clerk that the rule in that store is to wait on people rich and poor in the order in which they come in, and that is the only way in which he can do business, and he informs me that he is very sorry but that if I will have a little patience I will be waited upon soon. I yell at him and want to know why in the thunder he doesn't get clerks enough to attend to his business. He tells me that he does, but he cannot afford to hire a half dozen extra clerks to take care of a rush of an hour on Saturday night and let them sit around for the rest of the week. Yet this same merchant will take the head off of the poor telephone girl because there are rush times in her office when the shutters fall like snowflakes in a mountain storm during which she is unable to answer his telephone in a fraction of a minute. He calls up the manager and tells him that he uses his instrument more than anyone else in town (that is he gets more for his money than anyone else) and intimates that unless his telephone is answered at once he proposes to go to the city council and see what can be done about rotten service. The butcher complains about the blundering telephone girl and makes the air smell of sulphur every time she gives him the wrong number, but he sings mighty low when I tell him that I go home and find my wife in tears because she has company for dinner, ordered her meat at nine o'clock and the blundering delivery boy took it to the wrong house. He tells me not to be unreasonable; he hires the best help he can get, but that mistakes will occur. Yet the same men forget that a thousand subscribers may want to talk, all at once—they have a right to, even at night. They will not grant the same consideration to the telephone business they demand for themselves.

The telephone girl has no right anyone is bound to respect. She is responsible if the party the subscriber wants to talk to is out, if one of the hundreds of screws connected with the telephone is loosened, if the cord in the switchboard breaks, for storm, for wind, for sleet, for electric current, for lightning, for the fact that the dunned debtor refuses to answer the importunate creditor, for the fact that the delayed train has made up time, for the fact that the dress did not get home from the dressmaker, that there was a delay in calling the fire department, because it was not called five minutes before the fire broke out, for converting the sweetest angelic temper on earth into a vinegary one that stings like a hornet. In fact, she is to blame for all things evil on earth, under the earth and above the earth. At least that is the conclusion arrived at if we judge by those who forget that she is a human being and may be a lady although she toils for her daily bread. That she has the same characteristics, the same aspirations and the same fidelity to duty that other people have. As we forget when the telephone works and remember only when it does not. So we forget the thousand kindnesses, accommodations and favors that the telephone girl confers upon us that are outside of the duties of her employment.

The business man complains that the telephone girl has it in for him, forgetting that she does not have it "in for him" any more than he and his clerks "have it in" for the customer who persistently insults all clerks and the proprietor on every visit to the store. He fails to recognize, or condemn if he does see it, the habit that his employes have formed of imitating him in talking smart or abusive to central. Possibly courtesy might pay as well toward the telephone girl as towards other human beings.

The occupation is not an easy one. The dangers are not known to the public, nor fully appreciated by many managers. Newspapers inform us that a celebrated physician in Berlin is now conducting a series of experiments, to determine whether a telephone girl can be healthy and happy. In my judgment the solution will be reached much quicker by inducing business men to regard the telephone as a business proposition, whose operators deserve the same consideration and treatment which the business man expects his customers will extend to his employes. More operators are made nervous wrecks by bad temners of the subscribers than by bad insulation of switchboard appliances.

She is worthy the toast which we drink: Here is to the telephone girl. An employe who does the most work and suffers the most abuse for the money she receives. Who does more favors that are unappreciated by those upon whom they are conferred. Who gets censure for her bad deeds, and silence for her good ones. Who knows more about men than the sociologist does; more about women than the officers of the Federated Clubs, and more about the manners of children than the teacher does and who can tell where every gentleman and every lady lives. She is seen in all lands and in all climes, and speaks all tongues. God bless her!—*Address at the banquet of the Illinois Independent Telephone Convention at Peoria, Illinois.*

PROGRESS OF THE MONTH

Compiled by H. A. Downey

NEW COMPANIES

SODA SPRINGS, Idaho.—The Soda Springs Telephone Company has been organized at this place.

PALO, Mich.—The Fenwick Telephone Company has been incorporated with a capital stock of $8,000.

KIMBALL, Kan.—The Kimball Telephone Company has been incorporated with a capital stock of $3,500.

ALPENA, S. D.—The Cain Creek Telephone Company has been incorporated with a capital stock of $3,000.

JONES, W. Va.—The Big Hurrican Telephone Company has been incorporated with a capital stock of $5,000.

PAGE'S MILL, S. C.—The Page's Mill and Nichols Telephone Company has been incorporated at this place.

The entire village will be rewired and the system will connect with fourteen farmers' lines through the adjacent towns.

MILBURN, Ky.—The Milburn Independent Telephone Company has been incorporated with a capital stock of $1,000.

COTTONWOOD, Minn.—Articles of incorporation have been taken out by the Cottonwood Home Telephone Company.

ROBBINS, Minn.—The Riverside Co-operative Telephone Company has been organized with headquarters at this place.

GREEN BOTTOM, W. Va.—The Green Boottom Telephone Company has been organized and will construct a line to Huntington.

SYKESTON, N. D.—The Sykeston New Home and Roosevelt Telephone Company has been formed at Sykeston with a capital stock of $10,000.

HOWARD, S. D.—The Farmers' Co-operative Telephone Company has been organized and will construct lines in the northern part of the county.

HOLYOKE, Colo.—The Holyoke Telephone Company has been incorporated by George W. Shuler, Augusta Schenneman, A. T. O'Connor, of Holyoke.

PASCO, Wash.—The Twin City Telephone Company has been incorporated with a capital stock of $20,000 by R. A. Klinge, A. F. Brown and E. E. Klinge.

GOODNIGHT, Okla.—The Goodnight Telephone Company has been incorporated with a capital stock of $900 by P. Morrison, J. C. McMillan and J. F. Ralston.

PHILO, Ill.—The Philo-Fairland Telephone Company has been incorporated with a capital stock of $2,500, by George A. Lovingfors, Martin Kearne and others.

LETCHER S. D.—The Farmers' Co-operative Telephone Company has been organized at this place. The company is preparing to build lines to neighboring towns.

FISHER, Ill.—At a recent meeting citizens of Fisher and vicinity organized a telephone company and will either purchase the Coon Bros. exchange or build another.

WAUKESHA, R. F. D., Wis.—The Prospect, Guthrie and Big Bend Telephone Company has filed an amendment increasing its capital stock from $300 to $3,000.

HAZARD, Ky.—Hall Bros. have organized the Hall Bros. Telephone Company with a capital stock of $25,000 and a line will be built from Cornettsville to Colson.

ALEXANDRIA, La.—An Independent telephone company is being organized at this place. The capital stock will be $50,000. Application for a franchise will be made.

HERRICKVILLE, Pa.—A new telephone company to be known as the Herrickville Accommodation Line, has been organized at this place, and construction work will begin at once.

LILLIAN, Tex.—The Lillian Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are W. J. Manning, Dr. M. C. Cahill and T. V. Smyth, Jr.

HYDRO, Okla.—The Northwest Hydro Telephone Company has been incorporated with a capital stock of $1,500. The incorporators are William Gist, W. M. Hafer and Frank Pitzer.

PIERRE, S. D.—The Riverside Telephone Company has filed articles of incorporation with the secretary of state; capital stock, $2,500. The incorporators are Asa Rambo and others.

ALBANY, N. Y.—The Ellery Subway Telephone Company has been incorporated with a capital stock of $5,000 to construct and maintain a telephone line. The incorporators are Charles N. Hale, William Mahenna, Aaron W. Miller, Bemus Point N. Y., and others.

HOLLAND, Ia.—The Holland Telephone Company has been incorporated with a capital stock of $1,800. The incorporators of the company are H. W. Stork, Jno. Luebbert, John Heitman.

CENTRALIA, Wash.—F. B. Hubbard, president of the Eastern Railway and Lumber Company, is organizing a stock company for the purpose of operating an independent telephone system.

MILTON GROVE, Pa.—Farmers of Mt. Joy township and citizens of Milton Grove, have organized the Milton Grove and Mt. Joy Telephone Company to build a line between the two points.

BREESPORT, N. Y.—The Breesport Telephone Company has been incorporated with a capital stock of $2,100. The incorporators are C. H. Kinley, G. A. Campbell, H. B. Harding, Breesport.

ANETA, N. D.—A new Independent telephone company has been formed at this place and will construct a line to Devil's Lake, taking in the new towns in the southern part of the county.

THOR, Ia.—Business men of this place are forming an independent telephone company. About $2,000 has already been subscribed and indications are that the system will be installed.

DUNLAP, Ill.—The Dunlap and Alta Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are Walter Alten, W. D. Charles Threshie, Oscar Alten.

ST. JOHNS, Ariz.—The Arizona Electric Telephone Company has been organized with a capital stock of $100,000. F. W. Nelson is president of the company and Benjamin Schuster vice-president.

DAWSON, Minn.—The Town and Country Telephone Company has been incorporated with a capital stock of $50,000. The incorporators are Albert Ewing, Peter Bergh, Andrew Grande, Dawson.

TEKOTA, S. D.—Articles of incorporation have been filed for the Freedom Rural Telephone Company, with a capital stock of $5,000. The incorporators are John Stoffenson, Charles Halsig, and others.

CADIZ, O.—The Farmers' Telephone Company has been incorporated with a capital stock of $1,000. The incorporators are A. M. McCombs, James Love, J. M. Megaw, S. E. Adams, Lewis M. Peck.

THURSTON, O.—W. F. O'Gara has organized a telephone company in this place and will install exchanges in Thurston, Baltimore, Bazil, Millersport, and other points in the northern part of the county.

KELLIS STORE, Miss.—The McRae Independent Telephone Company has been incorporated with headquarters at this place. The incorporators are W. M. McRae, J. H. Adock, Sam O. Bell and others.

HARTFORD, S. D.—The Sunrose Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are J. P. Frederickson, William J. Forney, and Clarence Formna, all of Hartford.

CREVE COEUR, Mo.—Articles of incorporation have been filed for the Creve Coeur Telephone Company, with a capital stock of $2,000 and the company has made application to the County Court for a franchise.

ROOSEVELT, Okla.—The Kiowa County Rural Telephone Company has been incorporated with a capital stock of $10,000. The incorporators of the company are B. L. Sharp, J. P. Butler, and Charles Alexander.

ROCHESTER, N. Y.—The Simplex Telephone Equipment Company has been incorporated with a capital stock of $300,000. The directors of the company are J. A. Nolan, J. R. English, F. Fahrenfield, Rochester.

CATAWISSA, Pa.—The Farmers' Mutual Telephone Company of Catawissa township has been organized with the following officers: President, W. T. Creasy; secretary, N. C. Hartman; treasurer, F. P. Creasy.

POMEROY, O.—The Citizens' Telephone Company is being organized at this place by Jasper Jividen, G. W. Nease and Sam Baremore. It is the purpose of the new company to construct a line to Syracuse.

ELLSWORTH, Me.—George Grant of this place is interested in the formation of the Farmers' Telephone Company, which will construct lines connecting Columbia, Columbia Falls, Addison and Huntington.

AMESVILLE, O.—Articles of incorporation have been filed with the secretary of state for the Amesville Telephone Company with a capital stock of $25,000. The incorporators of the company are

A. E. Swayne, M. E. Clarke, C. P. Yocum, Hiram Hart and H. S. Hopkins.

GREENVILLE, Ill.—The Mutual Construction Company has been incorporated with a capital stock of $10,000 for the construction of telephone lines. The incorporators are George Grube, Ward Reid, G. B. Hoiles.

WILLSHIRE, O.—The Looking Glass Telephone Company has been organized with the following officers: President, A. C. Vernon; vice-president, S. B. Cockrell; secretary, William Voorheis; treasurer, W. E. Miller.

WELLSTON, Okla.—The Wellston-Luther Telephone Company has been incorporated with a capital stock of $10,000. The incorporators of the company are William S. Raupe, F. M. Raupe, and Frank V. Weathers.

ST. CROIX FALLS, Wis.—The St. Croix Valley Telephone Exchange has been incorporated with a capital stock of $25,000. The incorporators are Thomas H. Thompson, Fred Olcott, and William C. Thompson.

WARRENSBURG, Mo.—The Johnson County Home Telephone Company nas been incorporated with a capital stock of $150,000. The incorporators are J. P. Ozias, Harry T. Clark, W. L. Hickman, G. A. Lobben and others.

OLEAN, Mo.—The Russellville Telephone Company has been incorporated with a capital stock of $600. The incorporators of the company are J. L. Gilliland, P. P. Operson, W. V. Spalding, A. F. Hoffman and T. Gilliland.

WARRENSBURG, Mo.—The Warrensburg Home Telephone Company has been incorporated with a capital stock of $20,000. The incorporators are Charles A. Shepard, J. P. Ozias, Harry T. Clark, W. L. Hickman and others.

RIDGEFIELD, Wash.—Articles of incorporation have been filed for the Ridgefield and Vancouver Farmers' Union Telephone Company, with a capital stock of $1,700. The incorporators are George Page, F. A. Dodge, and others.

PIKEVILLE, Ky.—A company has been organized to construct a telephone line from the Knott county border to Pikeville. This will give telephone connections with Pikeville, Hindman, Jackson, Hazard, Harlan and Whitesburg.

MARIETTA, O.—The Mile Run Mutual Telephone Company has been incorporated with a capital stock of $2,500. The incorporators of the company are William F. Watkins, Leonard F. Winn, Jessie Thomas, Roger Fish and John S. Wynn.

AUDUBON, Ia.—The farmers southwest of this place have organized a telephone company, of which L. J. Anderson is president and John C. Jensen secretary. When completed the line will connect with the Farmers' company in this county.

HARVEY STATION, N. B.—The Harvey Telephone Company has been incorporated with Walter Purce as secretary. The company will construct a line from Harvey Station to York Mills. James Hunter of St. John will have charge of the work.

COLUMBUS, O.—Articles of incorporation have been filed with the secretary of state for the Ruggles Telephone Company of Ruggles, with a capital stock of $2,000. The incorporators are F. D. Hamilton, H. H. Sutherland, B. J. Ferris, and others.

MEDFORD, N. D.—The Medford Mutual Telephone Company has been incorporated with a capital stock of $600. The incorporators of the company are Dan McKeeth, A. H. Kellogg, M. B. Kellogg, Wm. Falter, Fred Olson, John Pfaunsmith, A. E. Hunt.

APPLETON CITY, Mo.—The Appleton City and Rockville Telephone Company has been incorporated with a capital stock of $25,000, of which $20,000 is paid. The incorporators of the company are E. A. Hook, J. S. Painter, W. I. Marriott and others.

ROCHESTER, Ind.—The Merchants' Mutual Telephone Company has been incorporated with a capital stock of $1,000 to operate a telephone system in Fulton county. The incorporators of the company are Alexander Ruh, Isaac N. Good, Joel R. Townsend.

AUGUSTA, Me.—The Stolz Electro-Phone Company has been incorporated with a capital stock of $1,000,000, for the purpose of manufacturing and selling electrical devices and instruments. A. M. Macomber is president of the company and E. J. Pike treasurer.

MONROE CENTER, Mich.—The Grawn Rural Telephone Company has been incorporated and the following officers elected: President, Fred E. Hill; secretary and treasurer, Edward Aldrich; directors, Fred Hill, Wm. Cox, Ed Aldrich, John Anderson, and Frank Smith.

CHILLICOTHE, Tex.—The Chillicothe Telephone Company has been incorporated with a capital stock of $10,000, to operate a telephone system in Chillicothe and rural lines within a radius of fifteen miles of said town. The incorporators are E. M. Webb, C. B. Felder and others.

HEYWORTH, Ill.—H. E. Fitchhorn, who has conducted the telephone exchange at Heyworth for several years, has sold his property, valued at $8,000, to a new corporation to be known as the Heyworth Telephone Company, with a capital stock of $10,000, receiving therefor stock for $5,000 and $3,000 in cash. The following directors have been elected: H. E. Fitchhorn, C. H. Rottger and Fred Beckman.

HELENA, Mont.—The Red Lodge-Fishtail Telephone Company, with principal place of business at Red Lodge, has been incorporated with a capital stock of $3,000. The directors of the company are Senfred Renland, S. Taggert, G. A. Russell, and others, all of Linley, Carbon county.

MOOREFIELD, Ind.—The Farmers' Mutual Telephone Company has been incorporated with a capital stock of $5,000. The directors of the company are as follows: Clarence B. Cotton, Scott Danner, John M. W. Riley, Cyrenius W. Brown, George W. Sharp, James H. Crandall, A. K. Smith.

CAMDEN, Pa.—The Philadelphia Electric Equipment Company has been incorporated with a capital stock of $25,000. The incorporators are John A. MacPeale, William F. Eidell, F. R. Hansell, all of Camden. The object of the company is to manufacture and deal in electric apparatus and machinery of every description.

UNION GROVE, Wis.—The Union Grove Telephone Company has been reorganized and incorporated with a capital stock of $5,000. The officers of the new organization are as follows: President, John S. Blakey; secretary, O. P. Graham; manager, W. J. Callendar; directors, John Gittings, William Tucker, and A. P. Nelson.

GREENBURK, Pa.—The Sugar Valley Telephone Company has been incorporated to operate in Clinton and Centre counties. The directors of the company are Harry G. Shearer, Lock Haven; David Tyson and H. A. Lamey, Greenburr; Harry Welshons, Russel Schreck and Byron Exkel, Booneville; Jerry I. Shaffer, Tylersville.

RICHFIELD, Neb.—The Sarpy Mutual Telephone Association has filed articles of incorporation with the secretary of state. The incorporators are Thomas Hamilton, L. C. Overton, and Herman Lieneman. The company authorizes issuance of capital stock to the amount of $25,000 and will have its principal place of business in Richfield.

GULLY, Ont.—The Haldimand Rural Telephone Company has been incorporated under the Ontario Companies Act, with a capital stock of $3,000, and offices at Gully, for the purpose of carrying on a general telephone business in the county of Northumberland. The provisional directors are T. Hosken, J. Ross, J. D. Craig, A. and T. Spear.

DEPOSIT, N. Y.—The Deposit Telephone Company has been incorporated with a capital stock of $12,000 to operate in Broome, Delaware and Chenango counties. S. S. Ormsbee of Syracuse is a director in the company. H. F. Stevens, also of Syracuse, is interested in the company. The remaining ten directors are all residents of Deposit.

ATKINS, Ark.—The Atkins Telephone Company has been incorporated with a capital stock of $10,000, $2,150 paid up. The Atkins exchange, which was owned by the Russellville Telephone Company, has been sold to the new incorporation. The officers of the company are: President, Twigs Brown; vice-president, J. F. Burris; manager, Joe Brown.

GUTHRIE, Okla.—The Barnitz Farmers' Mutual Telephone Company has been incorporated with a capital stock of $15,000 to operate in Dewey and adjoining counties. The officers of the company are as follows: President, P. D. Jones of Elmo; secretary and treasurer, W. D. Fine; directors, Elias Jones, Burmah; E. Crowder, Elm; J. A. Addings, Aledo.

HOUSTON, Tex.—The Southern Telephone Company is being organized by J. M. Reagan and associates for the purpose of constructing a telephone line connecting with the Independent lines at San Atonio. Exchanges will be installed at Richmond, Rosenburg, Wharton, El Campo, Victoria, Cuero, Yoaku, Eagle Lake, Columbus, Weimar and Schulenburg.

BOWLING GREEN, Va.—The Caroline County Telephone Co., has been incorporated with a capital stock of $10,000. The officers of the company are: President, C. T. Smith, Croxtons, Va.; vice-president, W. E. Innes; secretary, N. T. McManaway; treasurer, L. E. Martin, Bowling Green; directors, S. E. Pitts, Sparta; C. M. Harris, Whites, Va.; G. P. Lyons, Woodfords, Va.

FAIRVIEW, Ill.—The Fairview Southwestern Telephone Company has been incorporated with a capital stock of $1,000. The stockholders are as follows: J. E. Barlow, J. M. Lawson, Will Zittle Jerome Lawson, John Hartough, J. M. Dickson, Ernest Zumstein, John W. Gaddis, C. E. White, James White, G. H. Walter, Wilbur Dickson, C. F. Edmundson, H. C. Fingle, A. Brokaw.

FRENCHTOWN, N. J.—The Stover Telephone Company has been incorporated with a capital stock of $10,000. The incorporators of the company are John J. Stover, Matilda C. Stover, Carrie C. Stover, Erwinna, Pa.; Samuel O. Eddy and Joseph C. Butler, Frenchtown. It is the purpose of the company to build, construct, and operate telephone, telegraph, and cable lines throughout the state.

NEW CASTLE, Pa.—The South New Castle Telephone Company has made application for a state charter. The company will have

$5,000 capital stock, divided into 500 shares of $10 par value each. The company will operate lines in Taylor and Shenango townships and South New Castle. The directors of the company are Emanuel Weinschenk, R. H. Wright, Frank Scheikert and Louis Hasely.

BOUGHTONVILLE, O.—The Boughtonville Telephone Company has been incorporated with a capital stock of $10,000. The following directors have been elected: W. G. Blackmore, G. S. Catlin, J. O. Palm, S. E. Gleason, Willard Howard, E. E. Hole, E. A. Van Buskirk, J. D. Sparks, R. C. Snyder; president, W. G. Blackmore; vice president, G. S. Catlin; secretary, J. O. Palm; treasurer, S. E. Gleason

FORREST CITY, Ark.—The Forrest City and Cut Off Telephone Company has been incorporated with a capital stock of $1,000, of which $700 has been subscribed. The incorporators of the company are A. J. Pipkin, J. H. Dansby, W. T. Dansby, J. J. Barron, Allen Smith, Forrest City Grocery Company, B. D. Fletcher, Dan Wylds, N. E. Williams, Pettus & Buford, Russell Alderson, Graham Co., N. B. Nelson and the J. W. Black Company.

ELKHART, Ind.—Farmers in the vicinity of Dunlaps are organizing a mutual telephone company in rivalry to the Dunlaps Telephone Company, which connects with the Home Telephone Company of this city. The new company is headed by Calvin Huber as president, William J. Beasecker as secretary, and Harvey Miller treasurer. It is stated the chief reason for the new project is the fact that the Dunlap Company has increased its rates.

MONTEREY, Minn.—A new Independent telephone company to be known as the Cedar Lake Telephone Company has been organized by the farmers in this vicinity. The officers of the company are as follows: President, S. P. Pope; vice-president, M. Kassaulke; secretary, C. T. Swanson; treasurer, Carl Sjogren; directors, John Holtz, August Peterson and Emel Olson. It is the purpose of the company to make connection with the exchange at Triumph.

BIPPUS, Ind.—The Bippus Telephone Company has been organized to take over the property of the Luther Telephone Company. The headquarters of the company will be changed from Luther to Bippus, and arrangements will be made for overhauling the entire system and for the construction of additional lines. The officers of the company are as follows: President, Melvin E. Zent; vice-president, John Struble; secretary, Jacob Lahr; treasurer, Maro Knight.

PLAINVIEW, Tex.—A telephone company to be known as the Central Plains Telephone Company has been organized at this place with a capital stock of $10,000. The directors of the company are as follows: Lee Dye, Charles McCormack, T. D. Irwin, W. B. Martine, H. C. Randolph. It is the purpose of the company to install a local exchange and to build a toll line from Plainview to adjoining counties and also to Hereford and Amarillo. A charter will be applied for at once.

GREENSBURG, Pa.—The farmers of Mt. Pleasant and Unity townships will soon be connected with Greensburg and other towns by telephone. Elliss Adams, J. C. Fausold, and H. E. Keck of Kecksburg will make application to Governor S. W. Pennypacker for a charter for the Citizens' Telephone Company of Kecksburg, with a capital stock of $2,000. The company is composed entirely of local people and will be connected with the lines running to Greensburg, Mt. Pleasant, and Latrobe.

HARTFORD, Conn.—A certificate of incorporation has been filed with the secretary of state by the Columbia Construction Company of this city. The incorporators of the company are Edward D. Robbins, of Wethersfield, and Andrew J. Broughel and Charles E. Hubbard, of Hartford. The authorized capital is $50,000 and the company will begin with $1,000. The company is authorized to construct buildings, street railways and telegraph and telephone lines and to sublet the same.

LOS ANGELES, Cal.—Articles of incorporation of the Home Telephone and Telegraph Company, with an authorized capital of $10,000,000 stock and $10,000,000 bonds have been filed in the office of the county clerk. The incorporators are local capitalists. The company has been organized to take over the Home telephone plants in several southern California counties. So far ten of the outside companies have been absorbed and it is understood that options on a number of others have been obtained. Of the ten companies taken over, five have plants in operation.

PARSONS, W. Va.—The Alliance Telephone Company, organized a short time ago, has filed articles of incorporation with the secretary of state. The capital stock is $5,000, divided into 500 shares of a par value of $10 each. The incorporators are W. J. Digman, J. B. Phillips, L. C. Baker, Harry Shaffer and H. A. Ridgway. Officers have been elected as follows: President, G. T. Wilson; vice-president, L. C. Baker; secretary, Geo. A. Dean; treasurer, J. Riley Phillips; directors, L. C. Baker, Wm. J. Digman, G. T. Wilson, L. S. Stalnaker, and Geo. A. Dean. It is the purpose of the company to operate a telephone system in Parsons and vicinity and in adjoining counties.

ELECTIONS AND MEETINGS

WASHINGTON, Ia.—At the annual meeting of the Washington Telephone Company Orville Elder was elected president and H. M. Eicher vice president.

FISHER, Ill.—The Independent telephone company recently organized here has elected J. K. Waddington president, Frank Boyd secretary and J. O. Sayers treasurer.

STARK, Kans.—The Mutual Telephone Company has elected the following officers: President, John Lambdin; vice-president, Geo. Welch; secretary, Jas. Rea; treasurer, A. M. Sailors.

ROBERTSON, Ia.—At a recent meeting the Iowa River Telephone Company elected the following officers: President, J. S. Quiggle; vice-president, John Windecker; secretary, G. W. Stotser; treasurer, Joe Huse.

NOBLESVILLE, Ind.—The Home Telephone Company has elected the following officers: President, Thomas Griffin; secretary and treasurer, Elihu Hawkins; directors, E. M. Hare, Thomas Griffin, A. D. Booth, Harry McGrath, and Elihu Hawkins.

HENDERSON, Ky.—The Fourth District convention of the Kentucky Independent Telephone Association recently met in this city and organized by electing F. G. Hoge of Hopkinsville president and W. G. Turpin of Henderson secretary and treasurer.

MONTGOMERY'S FERRY, Pa.—The Eastern Perry Telephone and Telegraph Company, which will make application for a charter for a telephone line to extend from Montgomery's Ferry to Enola, has elected the following officers: Dr. A. L. Shearer, Dr. W. J. Wright, Dr. E. Walt Snyder, J. O. Beers, J. B. Jackson, and Z. T. Shuler.

MENA, Ark.—At a meeting of the directors of the Mena-Smithville Telephone Company of this city the following officers were elected: President, I. D. Jones; vice president, J. I. Alley; secretary and treasurer, C. A. Smith; directors, G. L. Lochridge, W. E. Anderson, J. I. Alley, Bert Hiltebrand, C. A. Smith, I. D. Jones and S. B. Graham.

QUINCY, Ill.—At a meeting of the stockholders of the County Home Telephone Company a board of directors was elected, who in turn elected the following officers: President, Thomas S. Elliott; vice president, Henry Wiskirchen; secretary, Charles H. Achelpohl. A report of the commissioners was read, which showed that the entire capital stock had been subscribed and paid in full.

GORHAM, N. Y.—The annual meeting of the Seneca-Gorham Independent Telephone Company was recently held at Stanley and the following officers were elected for the ensuing year: President, J. A. Driscoll; vice president, D. S. Allen; secretary and general manager, Rice McCauley; treasurer, William Pulver; directors, Thomas B. Wilson, William Pulver, A. D. Allen, Dr. Duncan, S. Allen, Edwin E. Hall, Rice McCauley, John A. Driscoll.

WINONA, Minn.—The stockholders of the Winona Telephone Company recently held their annual meeting in this place and the following officers were elected: President, Hon. James A. Tawney; vice president, P. E. Baumgartner; secretary and treasurer, Otto Troost, Jr.; directors, James A. Tawney, John Dietze, S. L. Wright, Edward Lees, P. E. Baumgartner. The company has an aggregate of six hundred miles of line in operation. Some new farmer lines will be constructed this fall and metallic circuits in the city will be extended.

JAMESTOWN, N. Y.—The Home Telephone Company recently held its annual meeting. The annual report of John H. Wright, general manager, was very satisfactory, showing that 467 new telephones had been added to the exchange during the year, making a total of more than 3,000 telephones in use in Jamestown, Lakewood, Celoron and Falconer. The following directors were elected for the coming year: Arthur C. Wade, William J. Maddox, Brewer D. Phillips, S. B. Burchard, and Ralph C. Sheldon of this city, Thomas W. Finucane, Carl F. Lomb, Frederick W. Zoller, George R. Fuller, John C. Woodbury, and W. R. MaCanne, all of Rochester.

SYRACUSE, N. Y.—The stockholders of the Independent Telephone Company recently held their annual meeting in this city and elected the following officers and directors: President, Hendrick S. Holden; vice-president, George R. Fuller; secretary, Alexander H. Cowie; treasurer, Albert K. Hiscock; manager, J. F. Stockwell; directors, Hendrick S. Holden, George R. Fuller, Alexander H. Cowie, Albert K. Hiscock, Jacob Amos, Gates Thalheimer, John J. Cummins, Thomas W. Finucane, Fred W. Zoller, Carl F. Lomb and Charles M. Warner. The plan of Manager Stockwell to proceed with the extension and improvement of the Syracuse plant was approved and it was voted to push all construction work in Syracuse to early completion.

KANKAKEE, Ill.—The directors of the Eastern Illinois Independent Telephone Company held their annual meeting in this city recently and re-elected the following officers: President, William Fraser; vice-president, J. H. Speicher; secretary, J. E. Sherwood; treasurer, T. A. Legris; traffic manager, Walter Fisher; general manager, A. J. Vernier. Although only two years old, the company has increased from 500 telephones to more than triple that amount. Of the 1,782 telephones in service, 1,420 are in this city. Plans

for the coming year were discussed, the principal being an extension of the line from Chebanse to Gilman, which will give the company connection with L'Erable and a number of smaller towns in that vicinity. Connection will soon be made with the Watseka Telephone Company at Clifton, which will give connection with Sheldon as well. Long-distance service to St. Louis by means of the Kinloch Telephone Company at Bloomington, is anticipated within the year.

TROY, N. Y.—At the annual meeting of the stockholders of the Commercial Union Telephone Company the following directors were elected: John T. Christie, W. Levis Burk, James H. Caldwell, Peter McCarthy, William Connors, William C. Geer, Cornelius V. Collins, William D. Mahony and Arthur MacArthur, of Troy; Edward Davis of Philadelphia, Pa.; Stephen C. Medbury of Ballston Spa, Edgar T. Brackett of Saratoga Springs, Charles W. Cool of Glens Falls and Brodie G. Higley of Sandy Hill. After the stockholders' meeting the directors re-elected the following officers: President, John T. Christie; vice-president, James H. Caldwell; second vice-president, Edward Davis; secretary, W. Levis Burk; treasurer, Peter McCarthy; assistant treasurer, William C. Colburn. At a previous meeting of the stockholders the action of the directors in purchasing the Rensselaer Telephone and Telegraph Company, the Saratoga Telephone and Telegraph Company and the New Union Telephone Company, was ratified.

ORDINANCES AND FRANCHISES

LAWRENCE, Mass.—A franchise has been granted to the Lawrence Automatic Telephone Company.

FINDLAY, O.—The Farmers' Mutual Telephone Company has applied for a franchise to construct lines with an exchange in this city.

LITTLETON, Colo.—The Northwestern Telephone Company recently organized at Longmont, Colo., has applied for a franchise in this place.

BROCKTON, Mass.—After a hard fought battle the Home Automatic Telephone Company has been granted a franchise to do business in this city.

ABERDEEN, Wash.—At a meeting of the city council a franchise was granted to E. C. Finch for the establishment of an Independent telephone system.

GARLAND, Utah.—A franchise has been granted to the Bear River Valley Telephone Company to install and operate a telephone system in this place.

BROCKTON, Mass.—A mass meeting was recently held in this city to consider a petition from the Home Automatic Telephone Company for a franchise.

BRENDA, Man.—The Melita-Arthur Independent Telephone Company of Melita, Man., has applied for the right to install a telephone line in this place.

RED BLUFF, Cal.—F. A. Graves and O. B. Wheeler have applied for a telephone franchise in this city. These parties have also secured a franchise in Glenn and Colusa.

MIDDLESBORO, Ky.—A franchise will be let to the best and highest bidder for a term of twenty years for the construction and operation of a telephone system in this place.

MABTON, Wash.—A franchise has been granted to the Christian Co-operative Telephone Association to establish and maintain a telephone system in this place for a period of twenty-five years.

COLUSA, Cal.—Dr. Rathbun, who recently purchased a county franchise, is organizing a farmer's telephone company, and the construction of lines, which will cover the entire county, will be commenced at once.

GOODLAND, Kan.—An ordinance has been passed granting the Goodland Telephone Company the permission to build and operate a telephone system in this city. C. E. Swarts and J. M. Jewell are the promoters of the company.

ALLIANCE, O.—The Sandy Valley Telephone and Electric Company, recently organized, has secured franchises at Malvern, Waynesburg, Magnolia and Sparta and will soon begin the construction of lines and exchanges.

LOWELL, Mass.—City Clerk Dadman has been notified that the Independent Telephone Company has accepted the franchise granted by the aldermen and that a bond for $10,000 will be filed September 1. As soon as the bond is given the company will begin work on its conduits.

BERKELEY, Cal.—The Home Telephone Company, through W. T. Thomas, its president, has filed a formal application for a fifty-year franchise with the town trustees. Under the terms of the proposed franchise ten telephones would be furnished free to the town authorities and 2 per cent of the gross receipts would be paid annually to the city, beginning five years from its date.

RUTLAND, Vt.—W. H. Baldwin, vice-president of the Albany Home Telephone Company, will, in behalf of the company, present a petition to the council for a franchise in this city. If the franchise is granted the company will begin the work of installing a system at once. It is the object of the promoters to extend the lines of the company into Vermont and eventually to Boston.

MACOMB, Ill.—The new company that is promoting another telephone system in this city has secured the franchise which was granted to Martin Price, Frank Whitman and Doug McCaughey in June, 1904, which was known as the Farmers' and Merchants' Telephone Company. The franchise was the property of Charles Zimmerman, Ed Alters, and John Berry, and they have transferred it to the new company.

KANKAKEE, Ill.—The Pontiac city council at a recent meeting granted a franchise to A. J. Vernier of Kankakee for the construction of an Independent toll and exchange line in Pontiac. The new company, which will be organized and incorporated at once, will be a home organization, with but few outside backers. Mr. Vernier will have charge of the work of construction, which will be commenced at once, and he expects to have everything ready for operation by January 1. The franchise requires that the wires be laid underground within the fire limits of the city.

SAN FRANCISCO, Cal.—Dr. F. Butterfield of Oakland, who represents the Independent Telephone Company, has filed a bid of $27,000 for a telephone franchise in this city. Attorneys Asher and Brobeck, representing the Independent Telephone Company, claim that the franchise awarded to the Home Telephone Company on April 23 was not legally awarded, as a non-judicial day existed at that time and was extended by the legislature, in so far as the statute of limitations applied to certain classes of proceedings, of which this is claimed to be one, until July 10. The Independent company holds that under the law and the conditions developed after the big fire, it had until July 10 in which to bid for the franchise, the limit of the time not expiring until then.

NEW CONSTRUCTION

NEWCASTLE, Ind.—The Citizens' Telephone Company will construct additional new lines.

MEXIA, Tex.—Weir Bros. & Weir, of Winsboro, Tex., are making arrangements to install a telephone system in this place.

RICHMOND, Ind.—The Home Telephone Company is making arrangements to construct a new building for exchange and office purposes.

ELIZABETHTOWN, Ind.—The Citizens' Telephone Company of Columbus contemplates entirely rebuilding its exchange at this place, which will greatly improve the service.

WHEELING, W. Va.—The contract for the establishment of a police telegraph system has been awarded to the National Telephone Company of this city at its bid of $800 a year.

LEAVENWORTH, Kans.—The People's Telephone Company has purchased a site and will erect a new and modern telephone plant, installing a complete new wire and cable system.

HILLSBORO, Ore.—It is the intention of the Midway Telephone and Telegraph Company, of which H. V. Gates of this city is president, to build a telephone line from Klamath Falls to Lakeview.

TORAH, Minn.—The Torah Telephone Company contemplates the construction of about fifty miles of new lines. The company operates a line between Torah and Cold Spring with a number of other branches.

MOOREFIELD, Ind.—The Farmers' Mutual Telephone Company recently incorporated has for its purpose the construction and operation of a telephone system in Switzerland county, with principal exchange at Moorefield.

PIKEVILLE, Ky.—The Eastern Kentucky Home Telephone Company, which is about completing its exchange at this place, will at once begin the construction of toll lines to Elkhorn and Marrowbone, connecting all important points in the coal fields.

EL CAMPO, Tex.—Louis Melcher and others have interested themselves in a proposition to put in a new telephone system in El Campo. It is the intention to connect with the whole county as a local system. Long-distance connection will be made with an Independent system at Nada.

ST. ANTHONY, Idaho.—Among the many improvements contemplated by the Fremont Telephone Company is the construction of a line from St. Anthony to Ashton, Squirrel, points in Teton Basin, to Victor, connecting with the Independent line in Jackson's Hole. A line will also be constructed to Idaho Falls.

JASPER, Ala.—The Home Telephone Company, recently incorporated with headquarters at this place, will at once install a complete system at Oakman. The company already owns a line that connects Jasper with America, Parrish, Drifton and Oakman. It is the purpose of the company to connect all the towns and country districts of the county with Jasper.

MANCHESTER, Ia.—At the semi-annual meeting of the Delaware County Telephone Company it was decided to install additional cable lines through the residence districts to meet the demand for additional service. The company has orders for telephones

which cannot be supplied until its facilities are increased. The business of the company is such as to pay a 10 per cent dividend every year, besides keeping up the necessary repairs

St. Stephens, N. B.—The Citizens' Telephone & Telegraph Company, recently chartered by act of the provincial parliament, has been granted the right to erect poles and string wires in this town, and will begin construction work at an early date. The company will connect with the Forest Telegraph and Telephone Company of this city, which is fitting up its exchange with a new switchboard to accommodate its increased business, and it is the intention of the promoters of the company to extend the system to the principal towns and cities in New Brunswick. Dr. L. Brehaut of Calais, president and general manager of the Forest company, is also president and manager of the Citizens' company.

EXTENSIONS AND IMPROVEMENTS

Greenwood, B. C.—The Greenwood Telephone system will be greatly improved.

Van Buren, Ind.—Plans are under way for the improvement of the Van Buren telephone system.

East Troy, Wis.—The East Troy Telephone Company will greatly enlarge and improve its system.

Richmond, Mo.—The Richmond Telephone Company is planning many improvements for its system.

Daleville, Ind.—The Daleville Telephone Company is making arrangements to improve and extend its system.

Manchester, Me.—The Woodland Telephone Company is considering the matter of greatly extending its lines.

Nashville, Ill.—The Southern Union Telephone Company is planning to build an extension of its line from this city to Beaucoup

Hilton, N. Y.—The Hilton Telephone Company, which recently increased its capital stock, is planning many improvements in its system.

Berkley, Va.—The Southern States Telephone Company, with headquarters at Norfolk, is planning extensive improvements in its plant in this city, work to begin at once.

Ardmore, I. T.—At a recent meeting of the Merchants' and Planters' Telephone Company, which operates telephone lines in Brock, Cheek, Oswalt, Simon, Rock, Orr, Grady, and a number of other towns, it was decided to further extend its lines.

Superior, Wis.—The Douglas County Telephone Company is planning extensive improvements during the coming year, which will include the installation of a new exchange, an overhauling of the entire system and the putting in of new cables and similar work.

Butler, Pa.—The People's Telephone Company has begun extensive improvements in its plant which, when completed, will make its service thoroughly modern and up-to-date in every particular. General Superintendent John E. Forsythe will have charge of the work.

San Diego, Cal.—The Home Telephone Company contemplates improvements which will represent an expenditure of about $10,000, and will include the construction of lines to Alpine, Descanso, Del Mar and other points. It is the intention of the company to cover the entire county.

Fort Worth, Tex.—J. C. Casler, general manager of the Fort Worth Telephone Company, announces that his company will within the next thirty days commence the work of making improvements in the city system to cost about $150,000. The capacity of the exchange will be increased so as to be able to manage between 6,000 and 7,000 telephones. The lines will also be improved.

FINANCIAL NOTES

Gorham, N. Y.—The Seneca-Gorham Independent Telephone Company has declared a 6 per cent dividend.

Circleville, O.—The Citizens' Telephone Company has declared its regular quarterly dividend of 1½ per cent.

Quincy, Ill.—The County Home Telephone Company has increased its capital stock from $2,500 to $500,000.

Columbus Junction, Ia.—The Columbus Junction Telephone Company has increased its capital stock to $20,000.

Beloit, Wis.—The Beloit Farm Telephone Company has filed an amendment increasing its capital stock from $5,000 to $10,000.

Monroe, Wis.—The United Telephone Company has declared a 4 per cent semi-annual dividend on its capital stock of $18,000.

Dexter, Mo.—The Southeast Missouri Telephone Company has filed a statement showing an increase of capital stock from $150,000 to $300,000.

Toronto, Ont.—The capital of the American Machine Telephone Company, limited, has been increased from $450,000 to $5,000,000, and the name changed to Canadian Independent Telephone Company, Limited.

Janesville, Wis.—The Rock County Telephone Company has declared the usual five per cent dividend on the business for the list six months.

Boonville, Mo.—The Boonville Telephone Company has filed a statement showing that it has increased its capital stock from $25,000 to $60,000.

Ashland, Va.—At the annual meeting of the stockholders of the Virginia Telephone Company, held in this city, a 10 per cent dividend was declared.

Warren, N. H.—At a special meeting of the Baker's River Telephone Company, held recently, it was voted to increase the capital stock of the company to $8,000.

Germantown, O.—The stockholders of the Germantown Independent Telephone Company are considering the advisability of increasing the capital stock to $20,000.

Mt. Pulaski, Ill.—The Mt. Pulaski Telephone Company has filed a certificate with the secretary of state showing an increase in its capital stock from $5,000 to $50,000.

Hamilton, O.—The Home Telephone Company has just paid its fourteenth quarterly dividend of one per cent to holders of its common stock, of which there are over 300 in Butler county.

Salt Lake City, Utah.—The board of directors of the Utah Independent Telephone Company, at a recent meeting decided to declare another dividend of 1 per cent which is the third quarterly dividend.

Flemington, N. J.—The Farmers' and Merchants' Telephone Company has increased its capital stock from $30,000 to $40,000 for the purpose of making extensions and has also declared a dividend of 2½ per cent.

Belmont, Wis.—The Belmont and Pleasant Valley Telephone Company, by its president, F. T. Hinkins, and secretary, John Hillery, has filed an amendment increasing the capital stock from $5,000 to $10,000.

Flemington, N. J.—The Farmers' & Mechanics' Telephone Company has declared a semi-annual dividend of 2½ per cent. The capital stock of the company has also been increased from $30,000 to $40,000 for the purpose of extending its system.

Erie, Pa.—Stockholders of the Mutual Telephone Company will hold a meeting in October to vote on the proposition to increase the bonded indebtedness of the company from $150,000 to $500,000. The increased capital is to be used in extensions and improvement of the system.

Frederickton, N. B.—The directors of the New Brunswick Telephone Company at a recent meeting decided to apply to the government to increase the capital stock of the company from $650,000 to $1,000,000. It is understood the new stock will be distributed among members of the company. For many years the company has been paying a dividend of 8 per cent.

Lincoln, Nebr.—The Lincoln Telephone Company, through its manager, L. E. Hurtz, has paid into the city treasury its 1 per cent assessment on gross earnings for the year ending April 1, 1906, as required under the franchise ordinance, which amounted to $791.81, the total of the gross earnings for the year, according to the manager's statement, being $79,181.54, which is considerably in excess of the previous year's business.

Kankakee, Ill.—At a recent meeting, the directors of the Eastern Illinois Independent Telephone Company declared the regular 2½ per cent semi-annual dividend. This is the fourth 2½ per cent paid in the past two years and in all amounts to $24,500, which has been paid to stockholders. The company will at once construct a line from Kankakee to Gilman, which will be twenty miles in length and will cost over $25,000.

Detroit, Mich.—The Home Telephone Company of Detroit has filed with the city clerk a $6,000,000 first mortgage deed of trust, to the Commonwealth Trust Company of St. Louis. The deed is issued to secure a bond issue to extend and increase the Independent telephone system which the company is constructing in this city. A bond issue of $3,250,000 will be made immediately and $2,750,000 of the bonds, secured by the trust deed, will be held for future use in extending the system. The issuance of the trust deed was authorized by the stockholders at a meeting held here a short time ago.

Manitowoc, Wis.—Officers of the Manitowoc and Western Telephone Company, one of the pioneer farmer lines in Manitowoc county, have just prepared articles of incorporation increasing the capital stock from $2,500 to $25,000 and mapped out a campaign for the betterment of the service and the construction of a trunk line from Greenleaf, Brown county, to Manitowoc. It is stated that at least $12,500 will be expended by the company this summer and fall in the improvement of its line and the extensions. Dr. R. S. O'Connell of Cato is president of the company, and John P. Watt of Maple Grove is secretary.

New York, N. Y.—The United River Platte Telephone Company of Buenos Ayres has issued 10,000 new common shares, increasing

its outstanding capital stock £50,000, for the purpose of extending lines in Buenos Ayres, La Plata, Rosario, and other towns. New Common battery switchboards and underground cables have been added to the company's equipment. Receipts for the year as presented at the company's annual meeting increased £30,000, while maintenance charges likewise showed an increase of £1,000. Net profit for the year was £7,823 better than last year and a dividend of 5 per cent, making a total of 8 per cent for the year, has been declared.

SPOKANE, Wash.—The Home Telephone & Telegraph Company of Spokane has filed a trust deed covering in blanket all the real and personal property, franchises, rights, privileges, telephone and telegraph lines, extensions, and all other possessions of the company of which they are now owners, as well as whatever property of similar nature may be acquired in the future by the company. The deed was granted to the Title Insurance & Trust Company of Los Angeles. The consideration is $3,000,000. The deed is signed by Charles E. Sumner, president of the telephone company, and W. W. Hindman, secretary. The object of the loan is to provide funds for the construction of the lines of the company as they have been planned for Spokane. It is contemplated to issue 3,660 bonds, 2,500 of which will be in the denomination of $1,000 each, the balance in the denominations of $500 and $100. They will run for thirty years. It is stated sale of the bonds has already been negotiated and funds will be available soon.

PERSONAL MENTION

MAYFIELD, Ky.—R. A. McCurdy has been appointed to take charge of the Home Telephone Company's plant in this city.

VINTON, Ia.—W. O. Brand has resigned as manager of the Vinton and Benton County Telephone Company of this place.

OREGON, Ill.—R. L. Fairbrother, who has had charge of the Ogle County Telephone Company's exchange here, has resigned his position with the company.

NEBRASKA CITY, Nebr.—At a recent meeting the directors of the Nebraska City Telephone Company elected Ralph Duff as general manager of the company.

BEATRICE, Nebr.—C. M. McNeill, who has been manager of the Home Telephone Company in this city for the last four years, has resigned his position with the company.

OSWEGO, N. Y.—J. F. Stockwell, formerly manager of the Ontario Telephone Company of this city, has been appointed general manager of the Syracuse Independent Telephone Company.

COLUMBIA CITY, Ind.—At a meeting of the board of directors of the Farmers' Mutual Telephone Company Robert S. Scott of this city was elected secretary to succeed Louis W. Dunfee, resigned.

LOUISVILLE, Ky.—Walter Hitch has resigned as manager of the Home Telephone Company of Sellersburg to take a position with the same company in this city, and has been succeeded by Oscar Weir.

PERU, Ind.—C. H. Brownell of Peru, telephone manufacturer, is preparing to increase his products 50 per cent. New factory buildings are being erected which will be equipped with the latest machinery.

NIAGARA FALLS, N. Y.—At a meeting of the executive committee of the New York State Independent Telephone Association, recently held in this city, Mr. R. Max Eaton was appointed secretary to succeed Mr. Lane, former secretary, who has resigned.

LINCOLN, Nebr.—F. B. Ebersole, formerly manager of the Lincoln Telephone Company of this city, has been appointed general manager of the Northeast Telephone Company of Portland, Me., which owns an important chain of exchanges, and will take up his work at once.

ALLENTOWN, Pa.—After long experimenting Charles West, general superintendent of the Consolidated Telephone Companies of Pensylvania, has succeeded in constructing a device whereby a telephone wire may be used for two conversations at once. It is known as the "duplex phantom" system. Arrangements are being made to put the invention into general use.

COMBINATIONS

JOHNSONVILLE, N. Y.—The Johnsonville Telephone Company and the Eastern New York Telephone Company have consolidated and in the near future will be connected.

INGOMAR, O.—The question of consolidating the Ingomar Telephone Association with the Preble County Telephone Company of West Alexandria is being considered.

CLOVERLAND, Wash.—Satisfactory arrangements have been brought about whereby the Farmers' Telephone Company of Cloverland, recently organized, has consolidated with the Cloverland Telephone Company. Additional wires will be strung between Asotin and Cloverland in order to accommodate the business.

TECUMSEH, Neb.—Announcement is made by the management of the Johnson County Home Telephone Company, the Independent company recently organized in this city, that the local exchange, including the rural connections, of the Adams County Telephone Company has been bought and merged with the other interests of the company. This acquisition will give the company about one thousand telephones, which very completely covers the northern part of this county, the vicinity of Adams and the exchange in Tecumseh. The company has recently increased its capital stock from $50,000 to $100,000 and the work of covering Johnson county complete is in progress.

TRANSFERS

MALVERN, Ark.—Penny Frisby has purchased the Clarksville telephone exchange at a cost of $4,000.

EDINA, Mo.—The Edina Telephone Exchange has been purchased by Geo. Kinsel and Filmore Marble.

MEADE, Kan.—The Plains Telephone Company of this place has been purchased by Chas. Boyer and Wess Edwards.

CARTHAGE, Ill.—The Mississippi Valley Telephone Company of this city has purchased the La Harpe telephone exchange.

SIDNEY, Ia.—C. G. Munsell has purchased the City Telephone Company's system at Tabor and will consolidate it with his system at this place.

NORWICK, Kan.—A. R. Meeker has sold his interest in the Norwick Telephone Company to John Wills, Jr., P. L. Wills and Henry Latta.

SAN ANGELO, Tex.—N. K. Weaver, Ozona, Tex., has purchased a half interest in the Dixie Telephone Company, formerly owned by Bascom Lynn.

MONMOUTH, Ill.—J. L. Gallaway of this city has purchased the Henderson County Farmers' Telephone lines and also the exchange at Stronghurst.

GRAND FORKS, N. D.—C. E. Burgess has purchased the Edwards-Wood and Company telephone line, formerly known as the North Dakota Telephone Company.

PALMYRA, Mo.—The Palmyra telephone plant, formerly owned by C. A. McComb, has been purchased by Wm. Lind of Hillsboro, Wis., for a consideration of $8,100.

BISMARCK, N. D.—The Hughes Electric Company of Bismarck has sold its telephone line from Bismarck to Dickinson and Glendive to the North Dakota Independent Telephone Company.

VERNDALE, Minn.—N. A. Lee is negotiating for the purchase of the local telephone exchange, with a view to rebuilding same. The exchange was damaged by fire in the early spring and has been out of use since.

DEXTER, Minn.—The Mower County Farmers' Telephone Company of this place has purchased all the interests of the Home Telephone Company of Grand Meadow in this village and the exchanges will be consolidated.

BRITTON, S. D.—The Social Telephone Company of Hecla is negotiating for the purchase of the new telephone line now being built southeast of this city and it is quite probable the line will be absorbed by the latter company.

HOWARD, Kan.—The telephone system formerly owned by Dr. Close has been transferred to the O. B. Walker Telephone Company, a new company. The two systems will be consolidated and work will at once be pushed to take out the old system and transfer all the business to the new.

GREENFIELD, Ia.—A contract has been closed whereby the Town Telephone Light and Traction Company of this place has purchased the telephone exchange of the Nexinville Telephone Company in Orient and will take possession August 1. It is the hope of the Home company to bring all Independent lines into one exchange.

COLUMBUS, Ind.—Representatives of the Citizens' Telephone Company of this city are negotiating for the purchase of the Hope Independent Telephone Company's plant, which is owned by O. W. Bowman and Simon Nading, Mr. Bowman being manager. Messrs. Bowman and Nading are said to have invested $25,000 in the plant.

TROY, N. Y.—The Commercial Telephone Company has perfected arrangements for taking over the Saratoga Telephone & Telegraph Company and the new Union Telephone Company of Glens Falls All three, which have been operated and practically controlled by the Troy company, will now be officially combined. The Troy company is now seeking control of the Co-Operant Telephone Company of Whitehall.

TOLEDO, O.—The Toledo syndicate, of which James S. Brailey, Jr., is the head, has come into control of the Independent Home Telephone Company of Detroit, Mich. The deal represents an investment of $3,000,000. Negotiations have been pending for more than a year. The same syndicate is now back of the Detroit plant as controls the Indianapolis and Cuyahoga companies and the Commonwealth Trust Company of St. Louis, which has under-

written the bonds, will receive as a bonus one-third of the stock of the company, which means one million dollars' worth.

AURORA, Ill.—A. B. Conklin, L. R. Parker, and William George of this city have purchased from Feder, Silberberg & Co. of Cincinnati, Ohio, the Independent telephone plant at Leavenworth, Kan. A new organization, with a Delaware charter, under the name of the People's Home Telephone Company has been perfected. The stockholders of the new company have authorized a bond issue of $300,000, with the American Trust and Savings Bank of Chicago as trustee. The officers of the new company are: President, W. T. Hewitt, Leavenworth, Kan.; vice president, William George, Aurora; secretary and general manager, L. R. Parker, Aurora; treasurer and superintendent of construction, A. B. Conklin, Aurora. The future prospects of the company are very flattering, the property being located in a territory where Independent telephony is very strong and popular. The property will be operated in connection with the property of the Streator Independent Telephone and Telegraph Company.

LEGAL ITEMS

MEMPHIS, Tenn.—I. Goldberg has brought suit against the Memphis Telephone Company for $15,000 damages, claimed to have been caused by the removal of the company's telephone from his place of business.

CHICAGO, Ill.—The Long Distance Telephone & Telegraph Company has filed a mortgage to the American Trust and Savings Bank of Chicago as trustee covering the company's entire system located in Alabama and other states. The mortgage secured an issue of $1,000,000 6 per cent bonds.

HAZLETON, Pa.—Hazleton is about to test the ordinance passed by councils taxing telephone, telegraph, and electric light companies for every pole in the city limits at the rate of $1 each. The Consolidated Telephone Company, which operates exchanges at this place, has refused to pay the tax on the ground that two judges in the commonwealth have decided that $1 is exorbitant and that 10 cents is a reasonable fee.

PONTIAC, Mich.—The mortgage of $10,000 held by August P. Vier of Paris, France, against the Thomas E. Clark Wireless Telegraph-Telephone Company, and others, has been foreclosed by Judge Geo. W. Smith. The building was sold under a mechanics' lien held by M. D. Heitsch, a short time ago, and was purchased by Arthur Pack, subject to this mortgage. In addition to the principal, $10,000, there is $557 interest.

GERMANTOWN, O.—A suit was brought against the Montgomery County Telephone Company by the Germantown Independent Telephone Company to compel the defendant to fulfill its part of a contract made Nov. 10, 1905, and to enjoin the defendant from severing connection with plaintiff's exchange and from refusing to accept or transmit any messages to plaintiff or its subscribers. A temporary restraining order was allowed by Judge Snediker.

SALEM, N. J.—George G. Waddington of Salem, a stockholder of the People's Rural Telephone Company, has filed a bill in chancery, and Vice-Chancellor Gray signed a rule to show cause in Camden why a receiver should not be appointed for the corporation on the grounds of insolvency. Waddington alleges that the debts of the company are $72,000 and that there is but $285.20 in funds to meet maturing obligations. He charges that the president and secretary of the oragnization have never rendered a satisfactory statement to the stockholders, and he wants the receiver for the purpose of getting an accounting.

SAN FRANCISCO, Cal.—Hugo K. Asher, representing Dr. Ferdinand Butterfield of Oakland, a representative of the United States Independent Telephone Company, has brought suit in the Superior Court to restrain the supervisors and Mayor Schmitz from granting a franchise to the Home Telephone Company, whose bid for the privilege was accepted on April 23. Asher claims that the franchise was worth millions and that his company was given no chance to bid for it. He charges irregularity in the acceptance of the bid and contends that the action is void. Judge Kerrigan granted a temporary restraining order, and the matter will soon be fought out in the courts.

AUSTIN, Tex.—Frank C. Smith of San Antonio has filed suit in the district court against J. E. Boynton and J. B. Earle of Waco and J. A. Quisenberry of Danville, Ky., all officers of the South Texas Telephone Company, to remove them and for damages aggregating $300,000. Smith, who is connected with the Independent local exchanges, states that he owns $27,500 of stock in the long distance Independent company and that the alleged mismanagement of the last named company is grounds for the removal of the three defendants and damages in behalf of the stockholders. There are two factions in the Independent companies and both are waging warfare against the other and attempting to secure exclusive control of the property. One has the local exchanges and the other appears to have gotten hold of the long distance company.

MISCELLANEOUS

ZEARING, Ia.—The immense growth of the local telephone system has made it necessary for the company to move into larger quarters.

TRENTON, N. J.—An amendment has been filed changing the name of the Cuban Telegraph and Telephone Company to that of the Havana Telephone Company.

ESSEX, Ill.—The people of Essex are making an effort to have the Independent telephone line reach this place and are willing to insure subscribers to make it profitable.

CRYSTAL CITY, Man. Can.—The town council has granted the Louise Telephone Company $200 toward building a long distance telephone line from Clearwater to Pilot Mound.

SYDNEY, C. B., Can.—At a meeting of the stockholders of the Eastern Telephone Company it was unanimously decided to pass the company over to the Nova Scotia Telephone Company.

MACOMB, Ill.—W. E. Dudman and A. A. Messmore are the most active promoters of the proposed new telephone system and are making a study of neighboring systems in the interest of the same.

REGINA, Sask., Can.—A convention of municipalities will be held in this city to consider the question of municipal telephone plants. P. McAra of this place is mentioned in connection with the meeting.

DIDSBURY, Alb. Can.—The residents of Didsbury, Alberta, have decided to organize for the purpose of installing a local telephone system. G. B. Sexsmith has been instructed to obtain prices, plans, etc.

JERSEY CITY, N. J.—The Street and Water Board has received an application from J. S. Ehrehart for the passage of an ordinance to enable an Independent telephone company to do business in this city.

YANKTON, S. D.—At the annual meeting of the stockholders of the Yankton Independent Telephone Company reports showed the company had enjoyed a great increase in business over the previous year.

MILBANK, S. D.—The Farmers' Telephone Company, which started business a year ago, has grown into one of the very best systems of the state. It has about 500 miles of wire and over 600 telephones are connected.

CENTERVILLE, S. D.—A second telephone exchange will be installed at this place, which will be Independent, and up-to-date in every respect, with long-distance connections and rural lines. The contract has been awarded for $4,000.

ALLENTOWN, Pa.—At a cost of more than $100,000 the Consolidated Telephone Company has completed the installation of its new automatic telephone system in this city. The exchange has a capacity of 4,000 instruments, which can be enlarged to 6,000.

FORT SMITH, Ark.—The Pan Telephone Company is being reorganized and there will be many changes and improvements made in the system in this city, which will include the installation of a new switchboard with a capacity of 8,000, new conduits, etc.

GOOD THUNDER, Minn.—Several business men of this place are considering the matter of installing a local telephone exchange. Organization will doubtless follow and a new line built, unless arrangements can be made to purchase the Citizens exchange.

TWO RIVERS, Wis.—The business of the Two Rivers Telephone Company has grown to such an extent that it is not able to fill its orders for service and necessitates many changes and improvements. The company contemplates the use of cables throughout the central part of the city.

KNIGHTSTOWN, Ind.—Through the Merchants' and Manufacturers' Association a deal has been closed whereby the Columbus Electric Company of McCordsville will move its factory to this place about Spetember 1. The company manufactures telephones and the "Leader" automobile.

SPRINGFIELD, Mo.—The new telephone company expects to spend $500,000 in the installation of its plant in this city. The franchise provides that there shall be no charge for telephones until the new company puts in 1,000 telephones. The company has no doubt that it will start with 1,000 or more.

WYMORE, Neb.—An ordinance repealing the franchise granted to the New Home Telephone Company has been vetoed by the mayor, and the company is now free to go on with its work. It is the intention to install an up to date system and connect with all the Independent lines in the county.

DES MOINES, Ia.—Five Independent long-distance telephone companies entering Des Moines have made arrangements with the Mutual Telephone Company to handle their business. These companies formerly operated an exchange of their own under the name of the Mutual Terminal Association.

WABASH, Ind.—The Home Telephone Company has begun a scheme of improvement that will cost $40,000. It is rebuilding all its outside work in the center of the city, putting in a multiple

system, central energy switchboard, and will erect an $8,000 building. The company has 1,300 subscribers.

HATTIESBURG, Miss.—The Hattiesburg Telephone Company, which was recently incorporated in this city, is rapidly pushing the construction of its plant and hopes to have the same in operation in the near future. Long distance connection will be had with the Home Telephone Company of Meridian.

MUSKOGEE, I. T.—Indian Inspector J. George Wright is making up the assessment list for telephone lines in Indian Territory. There are about 100 different companies doing business in the territory. The tax on telephones is 50 cents per mile for each line of toll wire. This does not apply to exchanges.

LEWISTON, Me.—The Maine Independent Telephone Association has been organized with the following officers: President, W. H. Paul of Portland; secretary and treasurer, H. L. Davis. The object of the organizations is to bring the companies more closely together and to secure long distance service to other states.

NEW CASTLE, Pa.—All negotiations for the consolidation of the Union Telephone Company and the proposed new line to be erected by the people of New Castle have ended and the company will proceed with the work of construction. Enough stock has been subscribed to guarantee the construction of the line.

PADUCAH, Ky.—The Home Telephone Company is making improvements on its system in this city which when completed will cost in the neighborhood of $175,000. The improvements include the installation of switchboards, new local lines and conduits. An additional switchboard capacity of 1,500 has been installed.

MINIER, Ill.—The Minier Mutual Telephone Company will make many improvements in its system and it is reported will experiment with the underground line, believing that after once installed the cost of maintenance will be of small importance compared to the expenditure necessary to keep overhead wires in repair.

RICHMOND, Ind.—Attorney A. C. Lindemuth, acting for the Richmond Home Telephone Company, has filed an acceptance of the terms of the ordinance recently passed by the City Council in reference to the reconstruction of telephone plants, and the construction of conduits and it was ordered placed on record.

CALAIS, Me.—The New Brunswick Telephone Company, with headquarters at Frederickton, N. B., is to operate on the Island of Manan, in the Bay of Fundy, off the coast of Maine and New Brunswick, and the work of building the line will begin at once. The company expects to install 200 instruments at the beginning.

IDA GROVE, Ia.—At a meeting of the board of directors of the Ida County Telephone Company the rates were reduced from $18 per year to $12 per year on rural telephones. The Farmers' Telephone Company is making arrangements for the construction of its lines and work will be commenced as soon as these are completed.

OKLAHOMA CITY, Okla.—The Pioneer Telephone Company has purchased a large share of stock in the Topeka and El Reno Telephone Company. The Topeka and El Reno company owns more than eight hundred miles of toll lines and has quite a number of exchanges. The two companies will be operated as separate organizations.

ASTORIA, Ore.—F. H. Stowe of Portland, who was recently granted a thirty-five year franchise for a telephone system in this city, has paid into the city treasury the sum of $500 as the first year's license and filed a formal acceptance of the franchise. He also filed a transfer of the franchise to the Home Telephone and Telegraph Company.

DYSART, Ia.—It is probable that another mutual telephone exchange will soon be established in this place. The Wettstein system which has its headquarters at La Porte and which has been connected with the local exchange, has severed its connection and announcement is made that this company will come into Dysart and establish an exchange.

EMPORIA, Kan.—The Emporia Telephone Company is improving its plant by the installation of a new switchboard. The company now has 2,000 telephones in service and many names on its waiting list. The company will further improve its system by changing the present system to a central energy system, which will necessitate the entire reconstruction of its plant.

GREENSBORO, N. C.—Representatives of the Independent telephone companies in North Carolina recently met in this city and formed an organization for mutual benefit. Some 25,000 telephones were represented at the meeting. The following officers were elected: President, W. A. Wynne of Raleigh; secretary and treasurer, B. W. Leavitt of Southern Pines.

YAZOO CITY, Miss.—Yazoo City has passed an ordinance prohibiting the stringing of telegraph and telephone wires on the same side of the street. This action is taken as a precautionary measure, and is intended to obviate the danger that exists of the various systems of wires becoming entangled, which would imperil the lives of those who might come in contact with the wires.

LIMA, O.—The Lima Telephone and Telegraph Company is making extensive improvements in its system, which include additional underground and aerial cables and a large addition to the switchboard. These extensions when completed will enable the company to furnish service to nearly 3,500 subscribers. The company now has 2,425 telephones in service in this city.

MANKATO, Minn.—At a meeting of the directors of the Mankato Citizens' Telephone Company the resignation of Dr. J. H. James as president was received and accepted, and Vice-President H. A. Patterson was elected president. Nic Peterson, one of the directors, was chosen vice-president. Dr. James has been president of the company almost from the time it was organized.

WOODSVILLE, N. H.—The third annual meeting of the Vermont and New Hampshire Independent Telephone Association was recently held in this place. The association represents 21,000 telephones in the two states, and 14,000 of these were represented by delegates at the meeting. Officers were elected for the purpose of drawing up resolutions for legislative enactment in Vermont and New Hampshire.

SEWARD, Alaska—The Seward Co-operative Telephone Company has installed a complete telephone system connecting all the camps of Seward peninsula with Nome. The company has received a twenty-year contract from the Nome-Kougack railway to establish a line along its road. There are 300 telephones in service in Nome. The company is entirely a local concern. G. P. Goggin of Nome is one of the directors.

GREENFIELD, Mass.—A meeting of dissatisfied telephone suscribers in Heath was held recently and it was voted to organize a company. Five directors were chosen as follows: President, I. W. Stetson; secretary and treasurer, C. J. Hager; Fred Stone, Levi Cooley, Ernest Payne. It was the sense of the meeting to build an exchange in town and connect with nearby towns which are favorable to the scheme.

BLOOMINGTON, Ill.—The Kinloch-Bloomington Telephone Company has about completed the extensive improvements which it has been making in its system in this city. Within the past eight months the company has expended in improvements the sum of $175,000 and when completed it will be one of the best plants operating anywhere, thus assuring better service than ever before in the history of the company.

SOUTH BEND, Ind.—The Long Distance Telephone Manufacturing Company of South Bend, which recently filed articles of incorporation with the secretary of state, proposes to establish a large plant for the manufacture of telephones, electric apparatus, electrical appliances and supplies, and all equipments necessary for an exchange or electrical plant. The directors are M. L. Seibert, Stanley A. Duval and Charles K. Seibert.

RICHMOND, Ind.—Superintendent Bailey of the Home Telephone Company has begun the work of drawing up plans and specifications for the installation of a complete, modern, and up to date telephone system, and when these plans and specifications are completed no time will be lost in carrying them into effect. It is planned to install new switchboards, telephones, and other equipment. It is estimated that $100,000 will be spent in the improvements.

BEATRICE, Neb.—Representatives of thirty-five of the forty Independent telephone companies operating in Thayer, Jefferson, Pawnee, Richardson, Johnson, Nemaha, and Gage counties recently met in this place and organized the fifth district of the Nebraska Independent Telephone Association. The following officers were elected: President, C. W. Bartlett, Fairbury; vice president, A. R. Morris, Blue Springs; secretary-treasurer, C. W. Pool, Tecumseh.

HARRODSBURG, Ky.—A telephone war has been waged in this city for some time against the East Tennessee Telephone Company. The company's franchise expired July 1 and it refused to bid on the new franchise issued, and issued an order that the poles and wires be taken down and the service discontinued. The citizens have decided to stand by the original franchise offered by the city council and there is talk of organizing a local company to put in a system.

HILLSBORO, Ill.—The Montgomery County Telephone Company will hold its annual meeting in this city the first of September for the purpose of electing a new board of directors and transacting other important business. The company has been in operation for the past four years and has built up a splendid business, there being at the present time more than 1,400 subscribers. H. H. Zimmermann is vice-president of the company and has been with it from the beginning.

ROCKAWAY, N. J.—Complaining they have not been able to get proper telephone connections, the business men of Rockaway Beach have planned to organize a co-operative telephone company, in opposition to the New York and New Jersey Company, which now has a monopoly of the telephone service along the seashore. A meeting was recently held at this place to consider the matter. The name of Dr. G. K. W. Schenck is mentioned in connection with the enterprise.

MERIDIAN, Miss.—Although the Home Telephone Company has only been in operation in Meridian since January 1, it already has 1,300 subscribers, and new ones are being added at the rate of fifty to seventy-five a month. Farmers' lines have also been built and

lines will be built making connection with the Long Distance Telephone and Telegraph Company of Alabama, thus securing connection with all important cities and towns on the coast to the Ohio River, including Memphis, Birmingham, and Louisville.

TIFFIN, O.—The officers of the Tiffin Home Telephone Company and the Farmers' Mutual Telephone Company have signed a contract, agreed upon some months ago, whereby the two systems will be connected and all subscribers will receive free service over both systems. The Home Telephone Company has more than 1,200 subscribers. The farmers expect soon to connect up the whole county and have several thousand instruments installed.

WEATHERFORD, Tex.—The Home Telephone Company, recently incorporated in this city, has begun the reconstruction of its entire system. The management of the company expects to have at least 800 subscribers by the time the new system is completed, which will be about September 1. Besides the city service about fifty rural lines will connect with the exchange. Long distance connection will be had with the Fort Worth Long Distance Telephone Company.

LINCOLN, Neb.—A report compiled by the Lincoln Telephone Company shows that the company had 3,583 telephones in operation at the beginning of the present year. The gross annual income for the previous year was $77,060.44. The operating expenses, maintenance, taxes, etc., were $38,053.05. The interest on bonds amounted to $24,414.67, leaving a surplus applicable to dividends of $14,581.72. The company is operating under a fifty-year franchise given by the city council.

SPOKANE, Wash.—The Home Telephone Company plans to have long distance connections out of Spokane with every Independent telephone line in this state and Idaho. Practically all of the Independent lines in the northwest, it is stated, have contracts with the Puget Sound Long Distance Telephone Company, providing for connections, and the Home Telephone Company has a contract with the Puget Sound company providing for connections with all of its allied lines.

COLLINWOOD, O.—The Cuyahoga Telephone Company is making improvements in its system in this city which will cost in the neighborhood of $50,000 and will include a new exchange building, new switchboard and the wires of the city are all being placed underground. It is the intention to formally open the new exchange about September 1. The improvements were made for the purpose of taking care of the growing business, the demand for service having outgrown the facilities.

ABILENE, Tex.—The Roberts Telephone and Electric Company has purchased a site and will at once begin the installation of a new and up-to-date telephone system, which will be ready for business about the 15th of October. The long-distance lines owned by this company reach about 35 towns and cities in the surrounding country, covering approximately 1,800 square miles, while with their connecting lines a service is furnished that covers a territory equal in area to almost any of the South Atlantic states.

KANKAKEE, Ill.—The Eastern Illinois Independent Telephone Company of this city, which three years ago had no telephones in Kankakee, now has 1,400 in the city and 1,800 in both city and country. Much of this success is due to the efforts of General Manager A. J. Vernier, who has had charge of the work for the past two years. There has been an increase of about 500 subscribers per year in the city alone. There are 2,500 Independent telephones in service in the county, all having been installed in the past two years.

KANSAS CITY, Mo.—The Kansas City Home Telephone Company, which some months ago purchased the Home telephone system in Independence, is making extensive improvements. M. L. Baker, manager of the Independence exchanges, states that the entire plant will be reconstructed. All of the wires in the business streets are to be placed under ground, while on other streets a system of cables is to take the place of single exposed wires to a great extent. A new toll line is to be built between Kansas City and Independence.

CLEARFIELD, Pa.—At the annual meeting of the stockholders of the Huntington & Clearfield Telephone Company reports showed 3,603 telephones in service in the territory, an increase of over 800 during the past year. Eighteen new exchanges have been installed by the company the past year and about 500 miles of pole line and 2,000 miles of wire have been added. General Superintendent W. L. Malin was authorized to submit plans and specifications for a new exchange at Indiana and report details at the earliest possible date to the directors.

TORONTO, Ont.—Arrangements are being completed for the annual convention of the Canadian Independent Telephone Association, which will be held in Toronto on September 5. There will be present representatives from the numerous Canadian organizations in the different provinces, as well as from the municipalities, which are also admitted to membership in the association. James B. Hoge and J. A. Harney, of Cleveland, O., president and secretary, respectively, of the International Independent Telephone Association, have been invited and will address the meeting on the Independnt telephone situation. There are over ninety absolutely Independent telephone systems in Canada, with over 4,000 Canadian shareholders, over $2,000,000 actually invested, and probably 15,000 subscribers.

FT. SMITH, Ark. The final reorganization of the Pan Telephone Company has been completed. The company has been capitalized at $500,000 and stocks and bonds issued, the stock being divided into 20,000 at $25 each. The stock is subscribed and the bonds have been placed, so that there is nothing in the way of the rebuilding and extension of the plant, which work is to begin at once. The officers of the company are as follows: President, Charles Sutter; vice-president, A. E. Boqua; secretary and treasurer, A. E. Boqua, Jr.

FREEPORT, Ill.—The Stephenson County Telephone Company has made a very fine showing in the past year. There are 1,725 subscribers connected with its exchange, of which 1,488 have been added during that time. Service to the surrounding country is given by means of 25 toll stations and connections are also made for about 150 rural lines, having an aggregate of 1,500 subscribers. Owing to the extreme activity of the past year which has so greatly increased the number of city subscribers, the rural line development has not been so great.

TOPEKA, Kan.—During the first six months of the present year the Topeka Independent Telephone Company installed 600 additional telephones. Commencing in a comparatively small way, a little over four years ago, this company has built up a patronage as shown by its last directory, issued July 1, of over 5,400 subscribers. The company is now erecting a new building in which will be installed entirely new and up-to-date office equipment costing $75,000. In addition the wires of the company in the central part of the city are being placed underground.

WHEELING, W. Va.—A syndicate of Washington capitalists is erecting a factory at Wheeling, for the manufacture of the telegraphone, an apparatus by which conversations over a telephone may be permanently recorded upon wire, tape or plates of metal. Time will not efface them. They cannot be rubbed out, and like the records of a phonograph, they will at any time give back the conversation in the exact voice of the sender. The instrument was invented by Dr. Polsen, a Danish electrician, brought to this country and sold to a Washington syndicate.

NEW YORK, N. Y.—The *New York Commercial* is authority for the statement that a prominent London banking house announces the purchase of a controlling interest in the Cuban Telephone and Telegraph Company and the Telefonica Company of Havana. It is proposed to organize them under the title of the Havana Telephone Company. The business will be continued under the control of a board of English directors, headed by Lord Elcho, who is well known in financial circles. Ample capital has been provided and the new management will install a modern plant.

GRAND RAPIDS, Mich.—An ingenious device which is claimed to be of high practical value to telephone and telegraph companies, the invention of Aleck G. Champlin of 310 Plainfield avenue, this city, has recently been patented. The new invention is designed especially for the use of linemen and electricians who find it necessary to wind or insulate wires already stretched, and it is intended to save the time and labor involved in either cutting the wires or winding them by hand. It is stated Mr. Champlin hopes to start a factory for the manufacture of his device in a short time.

GRINNELL, Ia.—The management of the Long Distance Telephone Company, which extends from this city to Iowa City and from Marshalltown to Oskaloosa, has been put into the hands of H. L. Beyer and G. L. Saunders for the coming year and an effort will be made by them to put this company on a better basis than heretofore. Mr. Beyer is president and Mr. Saunders is manager of the Interior Telephone Company of this place. An especial effort will be made to give better service than ever before and the work of thoroughly overhauling and improving the line will begin at once.

LATHAM, Mo.—There is a movement on foot to establish a county telephone exchange at this place with which all telephone companies incorporated will be asked to connect. The exchange will furnish connection with the following points: California, Tipton, Fortuna, Mutual, and Cotton. Ten other towns in Moniteau, Miller, and Cole counties will also be furnished with metallic connections as soon as they can be built. When completed there will be over 3,000 telephones connected. The estimated cost will be about $150,000 and long distance connection will be had with the Kinloch long distance system.

BALTIMORE, Md.—The Maryland Telephone Company is making plans to increase the capacity of its power plant in South Baltimore. The capacity of the boiler house will be doubled and a new turbine unit of 7,000 horsepower is to be installed. The rapid growth of the business of the company has caused the enlargement of the plant and the growth of the electric light department has been the result of less than a year's work. Plans are also being made for the installation of a new telephone system and it is expected that the board of directors in September will approve the plans and authorize the new features. The cost will be at least $1,000,000.

ITEMS FROM THE RURAL LINE DISTRICTS

Illustrated by Charles Beattie

The Oneida County Rural Telephone Company's exchange here is now in running order.—*Holland Patent Correspondence in Utica (N. Y.) Press.*

The Boynton Telephone Exchange are entering their new offices near the Crown Hotel.—*Pleasant Plains Correspondence Springfield (Ill.) News.*

Dr. John Scott has placed an Anthracite telephone in his office in the Seager building for the convenience of his many patrons.—*Hazelton (Pa.) Sentinel.*

W. Miller, proprietor of the Deer Creek telephone exchange, has sold his farm of 320 acres to Mrs. Irene Ramsey for $22,000.—*Bloomington (Ill.) Pantograph.*

The Telephone Company are distributing poles across the west part of the town, for the extension of their line.—*Owen Correspondence Rockford (Ill.) Star.*

The Northwood Telephone Company put in quite a few telephones in this neighborhood Friday.—*Brookfield and Hartland Correspondence in Northwood (Ia.) Index.*

The Pioneer telephone men called at several houses the first of the week to look after the telephone instruments.—*Coldwater Correspondence Pond Creek (Okla.) Vidette.*

A new telephone line is being put in west of Alvord. This line will connect all farmers between Alvord and Rock Valley, and is the 7th line into the former town.—*Rock Rapids (Ia.) Review.*

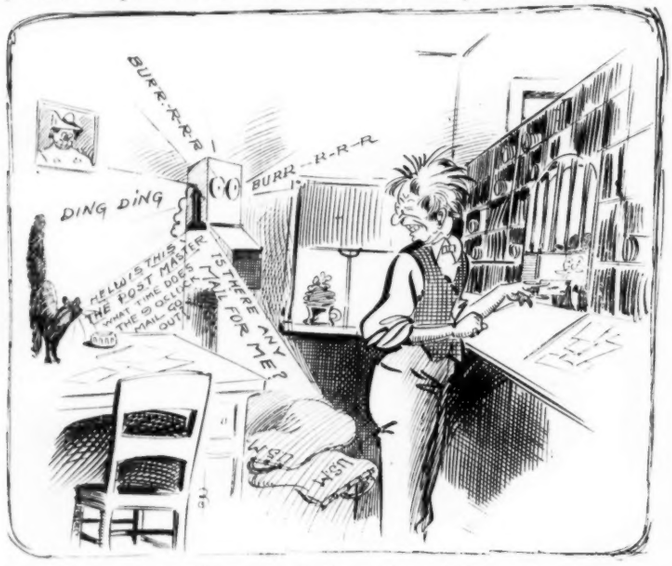
The telephone men were along here last week and put up two more wires. If companies keep on they will have our farms all checkered up with pipe lines, telephone and other lines.—*Morgantown (W. Va.) Post.*

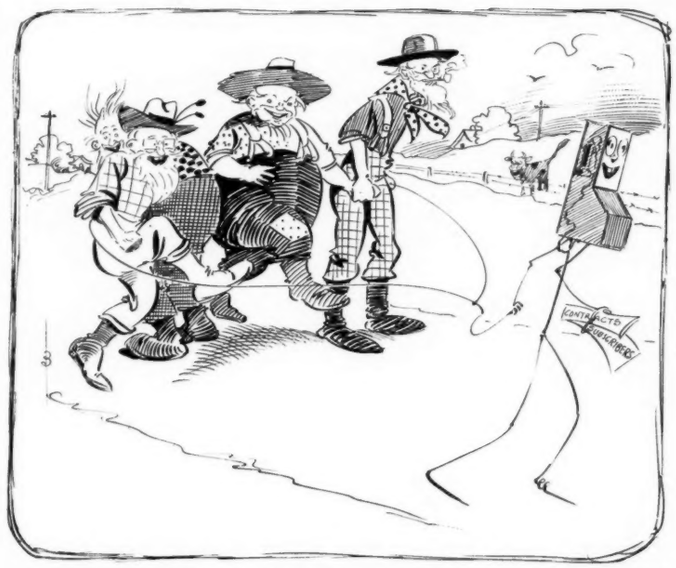
The new "farmers' line" proposed is now an assured fact, as the poles have been erected as far east as Locke's Cove. Kittery's long-felt want will be relieved at last.—*Kittery Correspondence Portsmouth (N. H.) Herald.*

Wm. M. Gray, manager of the local telephone exchange, is working night and day to improve the service. He takes a night shift on the toll lines and a day shift collecting the long green from his subscribers.—*Telluride (Colo.) Examiner.*

Three telephone subscribers living east of town, presented Miss Cora Schlegel, manager of its central office here, with a beautiful burnt wood glove box Thursday, which she prizes very highly coming from patrons.—*Bloomington (Ill.) Pantagraph.*

The telephone has come to be an almost indispensable attachment in most business houses and public offices, but in the Angola postoffice it proved to be such a source of annoyance that Postmaster Snyder has had it removed, his patience being exhausted by a multitude of trivial and unanswerable inquiries about the mails by patrons of the office.—*Ligonier (Ind.) Banner.*





A telephone taking in the farmers north of town is being added to this exchange.—*North Liberty Correspondence South Bend (Ind.) Tribune.*

Manager Louis Luft, of the Urbana Light Company, while talking through a telephone during the storm Friday evening received a shock which caused him to drop the receiver in a hurry. The lightning had struck the telephone wire.—*Urbana (O.) Democrat.*

The Home Telephone Company of Lexington is having troubles. Some one who evidently is an enemy sawed down eleven of the company's poles Wednesday night on the line just west of Elmo Franklin's. No clue yet as to who is the perpetrator of the outrage. —*Pontiac (Ill.) Sentinel.*

Miss Lorena Botkin, a telephone operator, to-day applied for a license to wed Joseph Hook, an engineer, explaining that the groom-to-be works from 6 to 6, and could not leave his post of duty to secure the document. The ceremony was performed at the bride's home at 1328 East First street.—*Dayton Correspondence, Cincinnati Enquirer.*

Dr. Babb's unfortunate Fourth of July celebration, when he shot a hole in a cable, is likely to prove an expensive one. A score of telephones are out of commission and the work of repairing the cable necessitates bringing an expert here from Chicago. The doctor greatly regrets the accident and will pay the costs of repairs.—*Canton (Ill.) Register.*

Miss Clara Schemenour, cashier at the Belle Telephone exchange, and Miss Maida Snyder, an operator, have returned from a delightful outing of eight days during which they visited Johnson's Island, Cedar Point, Sandusky, Put-in-Bay and other points of interest, looking as brown as berries and feeling like working twenty-five hours a day—*Findlay (O.) Republican.*

There is another valuable part of our city conveniences. Telephones now connect us with all the adjacent towns in this part of the state, and they extend throughout the county in all directions, so that farmers do not have far to go to communicate directly with this city and the world. Mr. Ed Wirt is proprietor and gives the system his time and attention.—*Garden City (Kan.) Reflector.*

We must say a word for the Steamboat Rock Telephone Company. They are doing all they agreed to and giving the best of service. Miss Rachel Wickham, the "hello girl," is always prompt to answer, and the right one in the right place. Also, the Hon. H. H. Turner and his substitute, John Luiken, in the absence of Miss Wickham, give the best of satisfaction. They have over seventy telephones in our little town, besides six rural lines, and are putting in telephones every few days. When a telephone is once put in it is a benefit to the whole community as well as ourselves. We must say if they were taken out of our homes it would be a bad thing.—*Eldorado (Ia.) Herald.*